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HYPOGLYCEMIA

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THE clinical aspects of hypoglycemia constituted one of Dr. Marriott's last interests, and during the last few years of his life he frequently urged us to report on the clinical and laboratory investigations made on his services at the St. Louis Children's and the St. Louis Maternity Hospitals. For this reason mainly, and also because we feel that we have reached a point in our studies where a review of previous observations seems indicated to point the way for future investigations, we are prompted to make such a report.

A few years ago, Shaffer and Ronzoni[1] summarized the known facts concerning carbohydrate metabolism and included a diagram illustrating the factors influencing the level of blood sugar. From such a diagram (Fig. 1) we may note the various ways in which hypoglycemia may result.

Although insulin plays a predominant rôle in the utilization of dextrose, we do not feel quite so strongly as Harris[2] that all subjects developing low blood sugar levels should be considered as cases of "hyperinsulinism." The clinical manifestations of hypoglycemia seem most directly the result of the lack of dextrose available to the central nervous system. Insulin, if accompanied by the administration of sufficient dextrose, may be given in very large amounts without the production of such symptoms. Therefore, it seems to us better to retain the term "hypoglycemia" and to attempt to classify each example in some way which will be of etiologic significance, as Wauchope[3] has done in an excellent paper. A classification which

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emphasizes properly the dominant position of insulin, but which also takes cognizance of other important etiologic factors, is the following:

Classification of Hypoglycemia

I. True hyperinsulinism (insulin excess):
   A. Hyperactivity of islands of Langerhans:
      1. Physiologic hyperactivity (induced by excessive carbohydrate intake).
      2. Hypertrophy or hyperplasia (compensatory or pathologic).
      3. Tumor.
   B. Insulin administration.

II. Relative hyperinsulinism:
   A. Lack of dextrose precursor substances:
      1. Diminished absorption from gastrointestinal tract:
         a. Starvation.
         b. Loss because of vomiting, diarrhea, or fistula, with and without infection (combination of diminished food intake and increased metabolism).
      2. Liver abnormalities (decrease in glycogen stores or mobilization).
   B. Lack of development or breakdown of regulatory mechanism:
      1. Normal newborn or premature infant.
      2. Endocrine imbalance: adrenal or pituitary insufficiency.
      3. Intracranial injury.
      4. Moribund state.

III. Cryptogenic.

It is, of course, obvious that hypoglycemia may be the result of any sort of combination of the above factors.

In presenting our material it seems best to discuss it under the above classification. It is first necessary, however, to comment briefly on blood sugar values by different methods and to define hypoglycemia. All of our determinations were made either by the original Shaffer-Hartmann reagent and method[4] or by the more sensitive Shaffer-Somogyi[5] "low blank" reagent, by the use of which greater accuracy is obtained when blood sugars are very low. Sometimes oxalated blood was used, and sometimes serum; and, furthermore, sometimes tungstic acid filtrates were prepared which give "apparent" dextrose values, regularly including reducing substances in addition to "true" dextrose, and sometimes zinc hydroxide or copper sulphate-sodium tungstate filtrates were used, which, as shown by Somogyi,[6-9] give substantially "true" dextrose values; i.e., they correspond quite closely to values for sugar fermentable by yeast. Sometimes determinations were made on capillary oxalated whole blood by

a micromethod (using 0.2 c.c. oxalated whole blood and making duplicate determinations of "true" dextrose). Of late, almost all the determinations were made by this method.* As shown by Somogyi,[6-9] and repeatedly confirmed in our laboratory (unpublished data), the difference between "apparent" and "true" values in whole blood varies between 23 and 31 mg. per cent, and averages 27, while for serum the difference is much less, between 6 and 10 mg. per cent, averaging 8. For such reasons, we have considered the dividing line between the normal blood sugar level and hypoglycemia to be 70 mg. per cent, if the value was "apparent" sugar of whole blood, 60 mg. per cent if "apparent" of serum, and 50 mg. per cent if "true." By

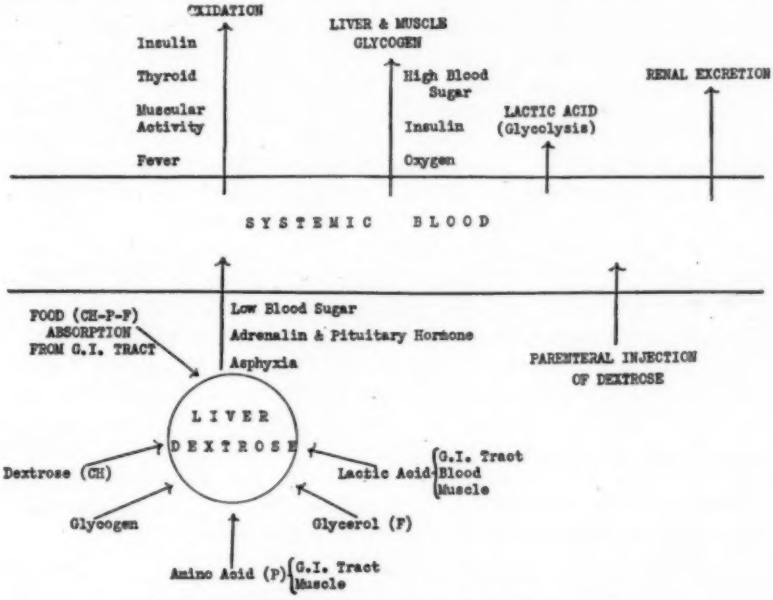

Fig. 1.—Factors controlling the level of blood sugar.

mild hypoglycemia we refer to values of 40 to 50 mg. per cent "true" sugar, by *moderate*, to values between 20 to 40 mg. per cent, and by *extreme*, 0 to 20 mg. per cent.

The following symbols are used to describe different values:

S. A. — serum "apparent"
W. B. A. — whole blood "apparent"
S. T. — serum "true"
W. B. T. — whole blood "true"
C. W. B. T. — capillary whole blood "true"

*This method, which was developed in Prof. Shaffer's laboratory, utilizes the zinc sulphate-sodium hydroxide precipitating reagents of Somogyi[5] and the sensitive Shaffer-Somogyi low blank reagent.[5]

I. TRUE HYPERINSULINISM (INSULIN EXCESS)

A. Hyperactivity of Islands of Langerhans

1. *Physiologic Hyperactivity.*—Known best perhaps as the Staub-Traugott phenomenon is the fact that frequently repeated ingestion of carbohydrate (as dextrose, for instance, in the ordinary dextrose tolerance test) leads to less and less postprandial hyperglycemia, and sometimes to a decided hypoglycemia. Such a developing hypoglycemia is usually explained as the result of induced physiologic hyperactivity of the islet cells.*

We have placed twelve of our cases of hypoglycemia in this group, and believe that another patient, E. B., should be included. In one patient (M. B.) the unusual ingestion of carbohydrate was in the form of surreptitious but frequent raids on the family icebox on the part of a two-year-old, and convulsions and unconsciousness were the clinical manifestations of hypoglycemia when the icebox was padlocked. In five cases the stimulant was the ingestion of dextrose (1.75 gm. per kilogram of body weight) as part of the well-known dextrose tolerance test, there being no clinical symptoms associated with the development of hypoglycemia. In two cases, hypoglycemia, also without clinical manifestations, followed single intravenous administrations of dextrose.

In this group we have also decided to place, for reasons discussed later, those infants born of diabetic mothers who showed a greater fall of blood sugar shortly after birth than normal infants sustain, as well as definite hypoglycemic symptoms, and in whom there was no very good reason to believe actual hyperplasia or hypertrophy of the islands of Langerhans existed. It is assumed that the stimulus for excessive insulin secretion in such cases is the hyperglycemia which would be transmitted directly from the mother to the fetus, if the former's diabetes were not perfectly controlled.

CASE 1.—M. B., a twenty-month-old, white male infant, was admitted to the St. Louis Children's Hospital, Sept. 3, 1931, with the following history: He was apparently in good health until early on the morning of admittance. On Sept. 2, 1931, he played about the house as usual, and seemed to be normal in every respect, with the exception of a rather poor appetite and one attack of vomiting. The parents went to awaken the child the morning of Sept. 3, 1931, and noticed he appeared listless and somewhat stuporous and was apparently unable to recognize anyone. A physician was called, but before his arrival a mild generalized convulsion occurred. The boy gradually improved, but during the remainder of the day, up to the time of admittance to the hospital, there had been hourly attacks of vomiting. Further questioning elicited the fact that the boy had for some time been stealing jam from the pantry and other sweets from the icebox. This habit was abruptly stopped two days previously by locking the pantry door.

On admittance the child was found to be well nourished and well developed, slightly stuporous, and he could be aroused only with great difficulty. His tempera-

*Himsworth,[10,11] however, is inclined to regard it as being due to increased insulin "sensitivity" brought about by increased activity of tissue insulin kinase.

ture was 36.4° C., the skin cool and moist, and an acetone odor to the breath was evident. His blood pressure was normal, and there was no evidence of infection. A catheterized urine specimen showed a 4+ ferric chloride test for diacetic acid. The blood sugar taken at this time was 20 mg. per cent (W. B. A.), with a serum carbon dioxide content of 30 volumes per cent. After the initial examination, before the blood sugar determination had been completed, 10 c.c. of 50 per cent dextrose solution were given intravenously. Before the injection was completed, the patient began to rouse and soon was fully conscious. At 7:00 P.M. he was found standing in his crib and was apparently normal in every respect. He was placed on a regular diet with a small amount of orange juice between feedings.

The blood sugar determinations on Sept. 4, 1931, at 9:00 A.M. and 1:00 P.M. were 76 mg. per cent and 86 mg. per cent (W. B. A.), respectively. On Sept. 5, 1931, a dextrose tolerance test revealed: fasting (W. B. A.) blood sugar, 77 mg. per cent; 30 minutes, 112 mg. per cent; 1 hour, 104 mg. per cent; 2 hours, 109 mg. per cent; 3 hours, 90 mg. per cent.

The boy had no further symptoms while in the hospital and was discharged on Sept. 7, 1931, with instructions to take a normal diet and a small amount of orange juice between feedings and before retiring. Communication from the parents on Oct. 12, 1931, indicated that the child had been in excellent health and had had no further symptoms.

CASE 2.—A. B., an eight-and-one-half-year-old girl, was admitted to the St. Louis Children's Hospital on June 1, 1936. About two years before, following measles, her urine was examined by the family physician and was reported to be positive for sugar. Since this time daily urine tests with Benedict's reagent gave a green and occasionally a yellow color. In September, 1934, she was placed on three injections of insulin, totalling 16 units, and a weighed diet. She had had only one mild insulin reaction, which was immediately relieved by orange juice. There had been a weight gain of 20 pounds during the previous year. Recently she had been on a regular diet but was not allowed to have a second serving or to eat between meals.

Physical examination was essentially negative, aside from slight obesity and findings of a mild upper respiratory tract infection. She was placed on a regular diet without insulin, but showed no glycosuria.

The dextrose tolerance test on June 2, 1936, was (W. B. A.) fasting, 77 mg. per cent; 30 minutes, 211 mg. per cent; 1 hour, 270 mg. per cent; 2 hours, 274 mg. per cent; 3 hours, 215 mg. per cent. Glycosuria was noted after the first hour of the test. This diabetic tolerance curve was thought to be due to a temporary insufficiency of the islands of Langerhans caused by the prolonged administration of insulin. The test was repeated on June 6, 1936, with the following results: (W. B. A.) fasting, 68 mg. per cent; 30 minutes, 190 mg. per cent; 1 hour, 224 mg. per cent; 2 hours, 212 mg. per cent; 3 hours, 91 mg. per cent; 4 hours, 30 mg. per cent. No glycosuria occurred during this test.

In a short time, apparently, the insufficiently functioning islands of Langerhans became hyperactive following the discontinuance of insulin injection and the increased carbohydrate intake. Two months after discharge from the hospital it was reported that her urine remained sugar-free on a normal diet without insulin.

Protocols of Infants Born of Diabetic Mothers

CASE 3.—B. Fa., a male infant, weighing 3,400 gm., was born at 8:15 A.M. on May 26, 1934. About twelve hours after birth he became slightly cyanotic, with irregular respirations, "jittery," and hypertonic. On May 27, 1934, at 9:00 A.M., the blood sugar (C. W. B. T.) was 22 mg. per cent, and at 4:00 P.M. that day, 42 mg. per cent; at 9:55 P.M. the blood sugar was 34 mg. per cent (C. W. B. T.). During the first day of life the infant required subcutaneous dextrose several times,

in addition to karo water by mouth, to relieve periods of restlessness and cyanosis. On May 28, 1934, at 9:20 A.M., the blood sugar was 65 mg. per cent, and at 4:00 P.M., 69 mg. per cent. From this time on, the blood sugar ranged between 56 mg. per cent and 78 mg. per cent. It was apparently necessary, however, to give repeated parenteral injections of dextrose to maintain such blood sugar levels. After the first week the child appeared normal. He was discharged on the fifteenth day, June 10, 1934, weighing 3,600 gm.

Follow-Up.—He was seen June 23, 1934, weighing 4,260 grams, with the history of no return of symptoms. He was again seen on Jan. 11, 1935, weighing 21 pounds, and on Jan. 25, 1936, weighing 29.5 pounds, seemingly perfectly normal. He was last seen on March 3, 1937, when a dextrose tolerance test was made: fasting, 85 mg. per cent; 30 minutes, 128 mg. per cent; 1 hour, 86 mg. per cent; 2 hours, 48 mg. per cent; 3 hours, 48 mg. per cent (C. W. B. T.). An insulin tolerance test was made on March 6, 1937, using one-fourth unit per kilogram of body weight (weight 15.9 kg.; 4.9 units of insulin): fasting, 81 mg. per cent; 20 min. after injection of insulin, 54 mg. per cent; 40 minutes, 28 mg. per cent; 1 hour, 46 mg. per cent; 1½ hours, 45 mg. per cent; 2 hours, 38 mg. per cent.

CASE 4.—B. Ba., when seen five hours after delivery on Jan. 26, 1934, was a large, fat, and flabby male, breathing well and appearing normal, except for slight cyanosis of his feet. He was brought to the St. Louis Children's Hospital at 3:30 P.M., at which time he was very cyanotic and breathing poorly. The heartbeat was feeble, the pulse rate being only 60. No improvement followed carbon dioxide inhalations. There were frequent twitchings of the eyelids and occasional convulsive movements of the extremities. The circulation was so poor that it was impossible to get even the small amount of blood necessary for capillary sugar determination. Superficial veins could not be seen. Two hundred and fifty cubic centimeters of dextrose were given subcutaneously, and 5 per cent karo water was given by gavage every two hours. The color gradually improved, and the heart rate increased. The morning following admittance, at 9:00 A.M., the capillary blood sugar was 48 mg. per cent. Frequent injection of subcutaneous dextrose and karo water gavage were continued. Vomiting began, however, and gradually became projectile in type.

At 8:00 P.M. on Jan. 27, 1934, an enema was given to ascertain the character of intestinal contents, since there had been no meconium noted since birth. The possibility of an intestinal obstruction was entertained because of persistent vomiting and abdominal distention. At 10:30 P.M. a firm, sausage-shaped mass was expelled by rectum, which had produced a rather typical meconium block, the so-called "meconium ileus." Following this expulsion the abdomen became soft and flat, and normal stools followed.

On Jan. 28, 1934, a barium meal was given because of persistent vomiting; fluoroscopic examination showed a well-filled stomach, approximately normal in size. A very small amount of the barium passed immediately through the pylorus. After about ten minutes there was no apparent change, except for a transient shadow in the esophagus caused by regurgitation of barium. Twenty-five minutes after feeding a large amount of barium was vomited. At this time still no appreciable amount was seen in the duodenum. Because of the definite gastric motor delay, all feedings by mouth were discontinued temporarily, and parenteral fluid administration was continued.

On Jan. 29, 1934, at 9:45 A.M., the blood sugar was 63 mg. per cent. Vomiting ceased. On Jan. 30, 1934, at 9:00 A.M., the blood sugar was 81 mg. per cent, and the child remained normal. He was discharged on Jan. 31, 1934.

Follow-Up.—He has been seen at frequent intervals since birth, and he has progressed normally, without hypoglycemic symptoms. On April 5, 1937, an insulin tolerance test was made (weight 34 pounds; given 3.8 units, or ¼ unit per kilogram):

(C. W. B. T.) fasting, 63 mg. per cent; 20 minutes, 44 mg. per cent; 40 minutes, 35 mg. per cent; 60 minutes, 32 mg. per cent; 1½ hours, 42 mg. per cent; 2 hours, 41 mg. per cent; 3 hours, 41 mg. per cent. No reactions were noted during the test. On April 7, 1937, a dextrose tolerance test was made, 1.75 gm. of dextrose per kilogram of body weight being given: fasting (C. W. B. T.), 72 mg. per cent; 30 minutes, 144 mg. per cent; 1 hour, 91 mg. per cent; 2 hours, 87 mg. per cent; 3 hours, 59 mg. per cent.

CASE 5.—B. Li., a slightly flabby, female infant, normal in other respects, and weighing 3,570 gm., was born at 9:30 A.M. on Jan. 28, 1937. The cord blood sugar at the time of delivery was 308 mg. per cent (C. W. B. T.). At 11:30 A.M., two hours after delivery, the blood sugar had dropped to 21 mg. per cent (C. W. B. T.). Aside from restlessness and some cyanosis around the lips, palms, and soles (frequently seen in newborn infants), no untoward symptoms were noted at this time. At 12:30 P.M. the blood sugar was only 6 mg. per cent, despite the lack of development of further symptoms. Three minims of adrenalin were given subcutaneously at 1:45 P.M. Following are blood sugar values during the remainder of Jan. 28, 1937: 2:15 P.M., 21 mg. per cent; 3:30 P.M., 43 mg. per cent; 5:30 P.M., 45 mg. per cent. At 6:00 P.M. feedings were started every four hours, 5 per cent karo water being given between feedings. The blood sugar at 7:30 P.M. was 23 mg. per cent, at 9:30 P.M., 28 mg. per cent, and at 11:30 P.M., 29 mg. per cent. On Jan. 29, 1937, at 1:30 A.M., the blood sugar had dropped to 22 mg. per cent, and at 3:30 A.M. it was 20 mg. per cent, and at 7:30 A.M., 15 mg. per cent. At this point cyanosis and some difficulty in respiration followed. At 9:30 A.M. the blood sugar had risen to 35 mg. per cent, after a small amount of 5 per cent dextrose subcutaneously. At 11:20 A.M. it was 36 mg. per cent; at 1:30 P.M., 45 mg. per cent, and at 3:30 P.M., 49 mg. per cent.

On Jan. 30, 1937, at 9:00 A.M., the blood sugar was 56 mg. per cent; at 2:00 P.M., 52 mg. per cent, and at 11:30 P.M., 83 mg. per cent. Approximately six hours after birth a barium meal was given to ascertain the emptying time of the stomach. Only a very small amount had passed through the pylorus one hour later, and by 5:20 P.M., there was at least two-thirds of the barium still in the stomach, with no appreciable change at 6:30 P.M. The infant did not vomit, however. She was returned to the St. Louis Maternity Hospital on Feb. 1, 1937, apparently normal in every respect. The remainder of her hospital stay was uneventful. The last blood sugar determination obtained on Feb. 4, 1937, was 64 mg. per cent. During the first five days of life the weight dropped from 3,570 grams to 3,320 grams, remained stationary a few days, and then showed the usual gain. On discharge, Feb. 10, 1937, the weight was 3,490 grams.

CASE 6.—B. Be., a male, weighing, 4,380 grams, was delivered at 11:30 P.M. on Jan. 29, 1937. There was some difficulty in delivering his shoulders and he required artificial respiration and tracheal suction for resuscitation. He was large, fat, flabby, very restless, with extremities quite cyanotic. He was taken immediately to the St. Louis Children's Hospital where carbon dioxide and oxygen inhalations were begun. The cyanosis disappeared from everywhere except the head. There was evidence of amniotic fluid aspiration and of atelectasis of the left lower lobe. The blood sugar taken one-half hour after delivery was 22 mg. per cent (C. W. B. T.). The mixed cord blood sugar taken at the time of delivery (11:30 P.M.) was 50 mg. per cent (C. W. B. T.). At 8:00 A.M. the blood sugar had fallen to 5 mg. per cent (C. W. B. T.). At 9:15 A.M., because of persistent cyanosis and occasional twitching of neck and face muscles, 3 minims of adrenalin were given subcutaneously. This was immediately followed by 100 c.c. of 10 per cent dextrose diluted with the same amount of Ringer's solution, also given subcutaneously. The blood sugar at 12:30

P.M. that day was 169 mg. per cent. However, the baby still remained quite cyanotic and dyspneic, the breathing being rapid and at times associated with a grunt. This was soon followed by a comatose state. It was suspected that there had been an intracranial birth injury because the fontanels were slightly tense. Diagnostic lumbar puncture could not be attempted at this time because of the critical condition of the baby. The blood sugar continued to drop, being 29 mg. per cent at 4:14 P.M. and 21 mg. per cent at 7:40 P.M. Subcutaneous dextrose was again administered, and at 8:30 P.M. the blood sugar was 112 mg. per cent. The infant continued to become more cyanotic, the respiration more labored, despite the rise of blood sugar. Respiration ceased at 1:30 A.M. on Jan. 31, 1937, thirty-seven hours after birth. An immediate postmortem lumbar puncture was done, and deep colored xanthochromatic spinal fluid obtained; cisternal puncture revealed the same type of fluid. It was, therefore, apparent that the child did not die of hypoglycemia, but because of obvious pulmonary and intracranial pathology.

CASE 7.—B. Ra., a male infant, weighing 2,600 gm., was born by cesarean section at 1:40 P.M. on May 13, 1937. Mixed placental cord blood taken at 1:40 P.M. showed 291 mg. per cent (W. B. A.) sugar. The mother's blood at 1:45 P.M. was 293 mg. per cent (W. B. A.), and the infant's at 1:45 P.M., five minutes after delivery, was 245 mg. per cent (C. W. B. T.). The child was immediately taken to the St. Louis Children's Hospital, and on admission to the ward was apparently normal in every respect, but looked slightly premature. C. W. B. T. at 3:45 P.M., two hours after delivery, was 41 mg. per cent, and at 6:00 P.M., 13 mg. per cent. During this time, however, no untoward symptoms were noted, aside from questionable listlessness. About 8:00 P.M., transient twitchings of the right arm and leg were noted. The color and respirations remained good, however. Blood sugar taken at 9:00 P.M. was 65 mg. per cent, and at 11:30 P.M., 91 mg. per cent. Fifteen cubic centimeters of 5 per cent karo water was fed about 8:00 P.M., between the 6:00 and 9:00 P.M. sugar determinations. Fifteen cubic centimeters of stock formula were fed at 10:00 P.M. and then every four hours, along with karo water between feedings.

On the following morning the infant looked well. No further twitchings were noted. The blood sugar at 4:00 A.M. on this day was 108 mg. per cent, and at 9:00 A.M., 73 mg. per cent. At 1:45 P.M. the blood sugar was 70 mg. per cent (C. W. B. T.).

On May 15, 1937, the feedings were increased to 30 c.c. The baby was hungry, taking food well, and remained asymptomatic throughout the day. The blood sugar at 9:25 A.M. was 62 mg. per cent (C. W. B. T.).

On May 16, 1937, three days after birth, there were a few loose stools, and the karo water was discontinued, but the formula was increased to 45 c.c.

On May 17, 1937, the blood sugar values at 9:45 A.M. and 1:30 P.M. were 47 mg. per cent and 69 mg. per cent, respectively.

On May 18, 1937, generalized twitchings and stiffening of the body, lasting only twenty to thirty seconds, were noted, the first at 12:00 midnight and the second at 5:30 A.M., two hours and three and one-half hours after feedings, respectively At 10:20 A.M. the blood sugar (C. W. B. T.) was 49 mg. per cent. At 1:30 P.M. (three and one-half hours after a feeding) the infant again began to have transient twitchings of the upper extremities and the right side of his face. He became restless, but his color and respirations remained normal. The blood sugar at this time was 60 mg. per cent. At 1:40 P.M. 3 minims of adrenalin were given subcutaneously. The blood sugar (C. W. B. T.) forty minutes after injection was 73 mg. per cent. At 8:30 P.M. generalized twitchings, which lasted twenty minutes, were again noticed. The blood sugar at this time was 66 mg. per cent (C. W. B. T.). Fifty cubic centimeters of 10 per cent dextrose were then given intravenously. The twitchings immediately stopped but were resumed for a few seconds fifteen minutes after the injection. The blood sugar (C. W. B. T.) one hour after dextrose injection was 245

mg. per cent. The child remained asymptomatic until May 19, 1937, at 4:30 A.M., when twitchings were again noted. Three minims of adrenalin were again given without relief; the blood sugar at this time was 148 mg. per cent (C. W. B. T.). Fifty cubic centimeters of 10 per cent dextrose were again given intravenously. During the injections the twitchings ceased. Blood sugar one hour later was 500 mg. per cent (C. W. B. T.). The child was slightly restless at this time, but had good color. The Chvostek and Trousseau signs were negative. At 9:30 P.M. the blood sugar was 148 mg. per cent. On May 20, 1937, at 9:45 A.M. the blood sugar was 84 mg. per cent. Spinal fluid was xanthochromic with many crenated red blood cells. The serum calcium was 11 mg. per cent, and the inorganic phosphorus, 6 mg. per cent. Transient twitchings still occurred on May 20, 1937.

There seems to be yet another and perhaps also important set of conditions in which a state of physiologic insulinogenic hyperactivity may be induced with the production of hypoglycemia when the stimulating source of carbohydrate is suddenly withdrawn. We have occasionally observed symptoms of collapse to follow a few hours after the discontinuation of the therapeutic continuous intravenous drip method of administering fluid containing salts and dextrose to infants incapable to absorbing them sufficiently in the normal way. The circumstances in such cases would seem ideal for the stimulation of excess insulin, but, as yet, we have not obtained sufficient data to prove that it occurs. The following case, however, is suggestive of death from such a cause, and even of the development of islet cell hyperplasia (Figs. 6 and 7).*

CASE 8.—E. B., a white, male infant, was first seen at the St. Louis Children's Hospital on Oct. 9, 1936, at ten weeks of age, because of anorexia, diarrhea, and vomiting of six days' duration. He was born at full term, but weighed only 5 pounds 9 ounces at birth. He had been fed on a very dilute evaporated milk mixture, and gained poorly, weighing only 6 pounds 3 ounces on the day before illness began.

He was found to be markedly undernourished, anemic, mildly dehydrated, and he weighed only 2,700 grams. Evidence of a subsiding upper respiratory tract infection was found. Routine Wassermann and tuberculin tests and urine examination were negative. After parenteral fluid administration and two blood transfusions, the diarrhea promptly subsided, and he was discharged in a few days, weighing 2,900 grams and showing a steady weight gain.

He was again admitted to the hospital on Nov. 24, 1936, at the age of four months. There had been a weight gain of only 6 ounces during the interval. He seemed normal otherwise, until two days before admittance, when vomiting and diarrhea began.

*Since this paper was originally submitted for publication, we have had an opportunity to secure blood sugar data on such a case: Baby S. was admitted to the St. Louis Children's Hospital on June 8, 1937, when twelve days of age, because of severe diarrhea which had led to dehydration and acidosis. After she failed to improve with ordinary measures, she was treated for a period with complete restriction of food by mouth and with a continuous intravenous drip of equal parts of 10 per cent dextrose and lactate-Ringer's solution, which was begun on June 14 and continued until June 18. Just before discontinuation, the capillary blood sugar was 125 mg. per cent (C.W.B.T.); one hour later it was 92 mg. per cent, and one hour after that 60 mg. per cent. Seven hours after its discontinuation, the blood sugar dropped to 9 mg. per cent, and this fall was accompanied by the hypoglycemic symptoms of very marked restlessness and cyanosis, and the appearance of impending collapse. Recovery from these symptoms followed immediately after the administration of 75 c.c. of 10 per cent dextrose intravenously. At 4:00 A.M. on June 19, the blood sugar was 35 mg. per cent, and at 9:50 A.M., 53 mg. per cent. There has been no recurrence of hypoglycemic symptoms up to the present time, June 24, 1937.

Aside from marked emaciation and dehydration, the physical examination was essentially negative. Stool culture and routine blood and urine examinations were negative. It was not until Dec. 3, 1936, nine days later, after frequent parenteral fluid administrations, that there was evidence of a focus of infection. At this time both eardrums were found to be dull, thick, and gray. Proper drainage of the ears was established, but the child continued to have five to six diarrheal stools per day. Because of the necessity of frequent subcutaneous fluid injections to prevent dehydration, a continuous intravenous drip was started on Dec. 3, 1936. Equal parts of 10 per cent dextrose and lactate Ringer's solution were used. The continuous intravenous therapy was maintained uninterruptedly for six and one-half days, until Dec. 10, 1936.

On Dec. 14, 1936, a right antrotomy was performed. From this time on there was a gradual abatement of the diarrhea. Because of the persistent anorexia and failure to gain, 2½-ounce feedings were given by gavage.

On Dec. 23, 1937, two units of insulin were administered subcutaneously, twenty minutes before feedings, to stimulate the appetite. Three hours following the second injection, the infant was found dead. Unfortunately, no blood sugar determinations were made before death.

2. *Hyperplasia or Hypertrophy.*—The first experience of one of us (A. F. H.) with the special problems arising in infants newly born of diabetic mothers ended tragically, as both the mother and infant died a few days after birth. The infant, prior to death, had developed symptoms in keeping with severe hypoglycemia, although the single blood sugar determination ten hours before death was not unusually low for a newborn infant, and at autopsy a very striking hyperplasia and hypertrophy of the islands of Langerhans was noted. This case has been reported in detail by Gray and Feemster,[12] and similar cases have been reported both previously and subsequently by others.

CASE 9.—B. C., a female, was born on Sept. 23, 1924. The expected date of birth from the menstrual history was Oct. 19, 1924. Cry and respiration were spontaneous. The birth weight was 3,330 grams, and no abnormalities were noted. On the third day of life portions of each feeding were vomited; on the fourth day it was noted that the infant had a pasty, peculiar color. The temperature that morning was 38.3° C., and the blood sugar 67 mg. per cent (W. B. A.). The baby died unexpectedly at 7:30 P.M.

At autopsy there were found hypertrophy and hyperplasia of the islands of Langerhans, hypertrophy of the adrenal medulla, with hemorrhage and necrosis, pulmonary atelectasis, and bilateral double ureter and pelves. The findings in the pancreas and adrenal glands in addition to hemorrhage were especially interesting. The adrenals microscopically showed marked increase in the size of the medullary cells; many of the nuclei were hyperchromatic, others vesicular. The pancreas weighed 3 gm. and measured 4 cm. in length. It was firm, slightly congested, and showed numerous white pinpoint areas. Longitudinal sections made through the pancreas included head, body, and tail. The acinar tissue showed nothing unusual, but the islets were both very numerous and large. A few definite mitotic figures were seen (Fig. 4).

It would seem that in such a case as this and in others referred to above, hyperplasia, rather than simple physiologic hyperactivity, might have been the result of the frequent or continuous stimulation

which hyperglycemia originating in the mother and extending to the fetus is capable of producing. That diabetes in the mother need not be necessary for islet cell hyperplasia in the fetus is shown conclusively in the following case, in which the infant died on the second day of life with convulsions, most probably of hypoglycemic origin. Most unfortunately no blood sugar determinations were made in this case.

CASE 10.—B. B., a female infant, was delivered without especial difficulty at 11:40 A.M. on Feb. 9, 1934. The cry and respirations were spontaneous. The child was large and flabby and weighed 5,140 grams, but was perfectly normal in every other respect. Her course was uneventful until Feb. 11, 1934, at 5:00 A.M., when generalized muscular twitchings developed. These convulsive movements were repeated during the next few hours, first localized to the right and then to the left side of the body. No respiratory or circulatory disturbances accompanied the attack. At 11:50 A.M. on Feb. 11, 1934, during an examination, the infant suddenly became limp, cyanotic, and rapidly expired. The only abnormal findings at necropsy were confined to the pancreas (see Fig. 5). There was no evidence of birth hemorrhage. The symptomatology presented by this patient, together with the necropsy findings of islet cell hyperplasia of the pancreas, were very suggestive that hypoglycemia was responsible for the infant's death.

3. *Tumors.*—In adults, hyperfunctioning adenomata and tumors of other types have been found both at autopsy and operation, and some brilliant therapeutic results have followed the removal of such tumors. We are aware, however, of only one such tumor found in a child.[13]

B. Insulin Administration

Everyone is familiar with the fact that hypoglycemia may follow an overdose of insulin and it is not our intent to discuss this type at this time, but merely to emphasize that it is the most frequent single cause of low blood sugar. During the course of almost fifteen years, we have inadvertently given overdoses of insulin to diabetic infants or children, which produced hypoglycemia in 180 instances. Sometimes there were no important associated clinical manifestations, at other times such severe symptoms as convulsions and unconsciousness. The distribution frequency of the three arbitrary degrees of hypoglycemia were as follows:

(1) mild (40-50 mg. per cent "true" dextrose) — 45.0 per cent
(2) moderate (20-40 mg. per cent "true" dextrose) — 48.3 per cent
(3) extreme (0-20 mg. per cent "true" dextrose) — 6.7 per cent.

In five athreptic infants, given insulin to stimulate their appetites, mild or moderately severe degrees of hypoglycemia resulted when one-half or more units of insulin per kilogram of body weight were given, and their feeding delayed for one-half hour or longer. In two children given insulin with dextrose intravenously, the insulin was given relatively in excess and mild hypoglycemia resulted. In one instance hypoglycemia followed the administration of insulin to a case of hyperthyroidism for its possible therapeutic effect.

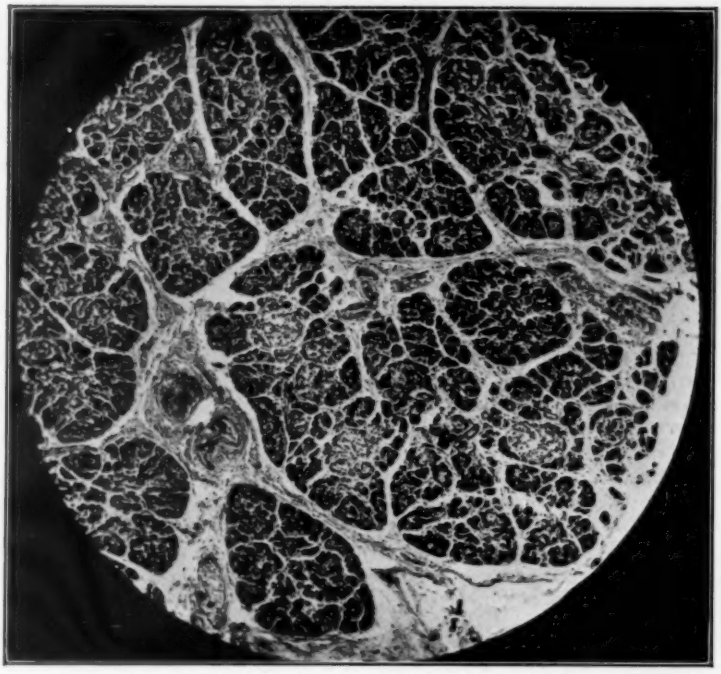

Fig. 2.—Section of pancreas of a "normal" newborn infant, selected to illustrate an area least rich in island tissue.

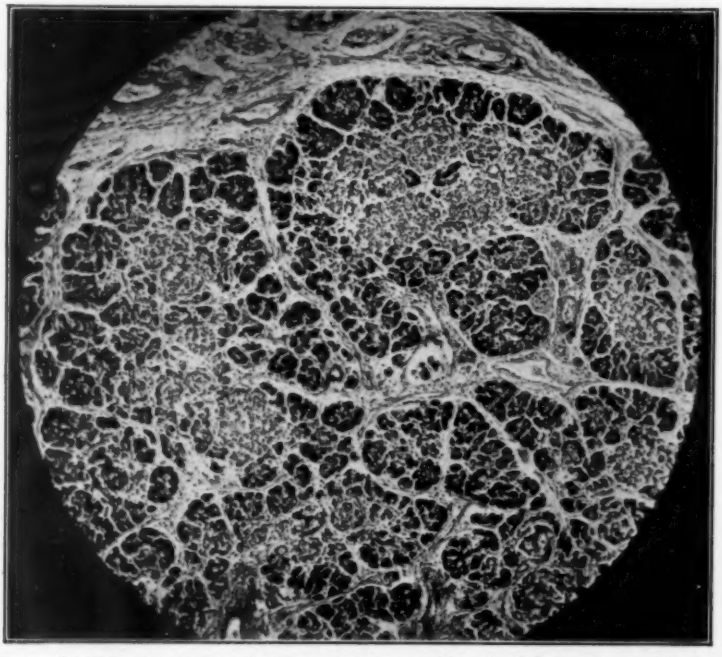

Fig. 3.—Section of pancreas from same case as Fig. 2, showing area richest in island tissue.

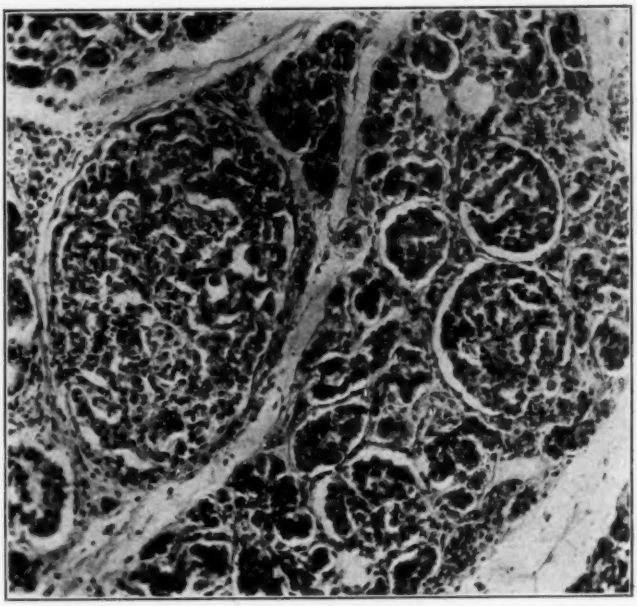

Fig. 4.—Section of pancreas from B. C. (Case 9), infant born of diabetic mother, showing hyperplasia of island tissue.

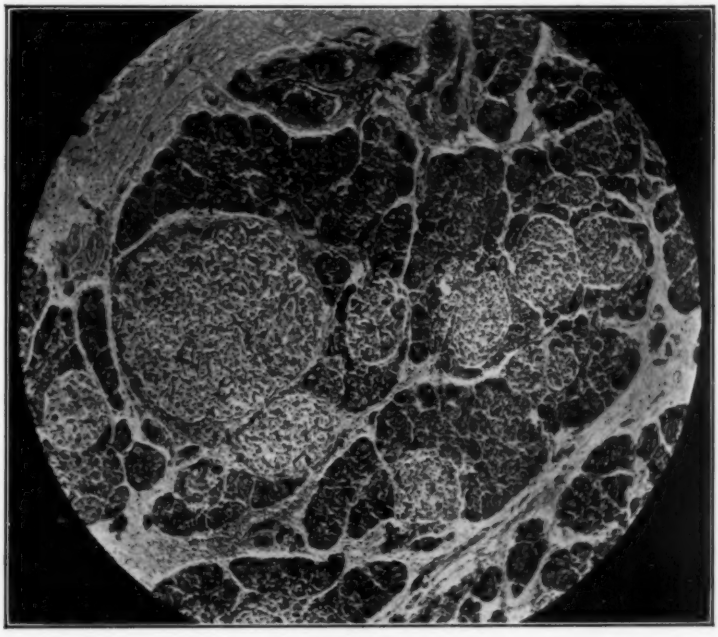

Fig. 5.—Section of pancreas from B. B. (Case 10), born of a normal mother, showing hyperplasia of island tissue.

II. RELATIVE HYPERINSULINISM

A. Lack of Dextrose Precursor Substances

Hypoglycemia, instead of being caused by too rapid a removal of dextrose from the blood stream in response to too much insulin, may be the result of poor restoration of blood dextrose after its more or less normal removal, because of a paucity of glycogen storage, particularly in the liver, or because of insufficient absorption of carbohydrate from the intestines.

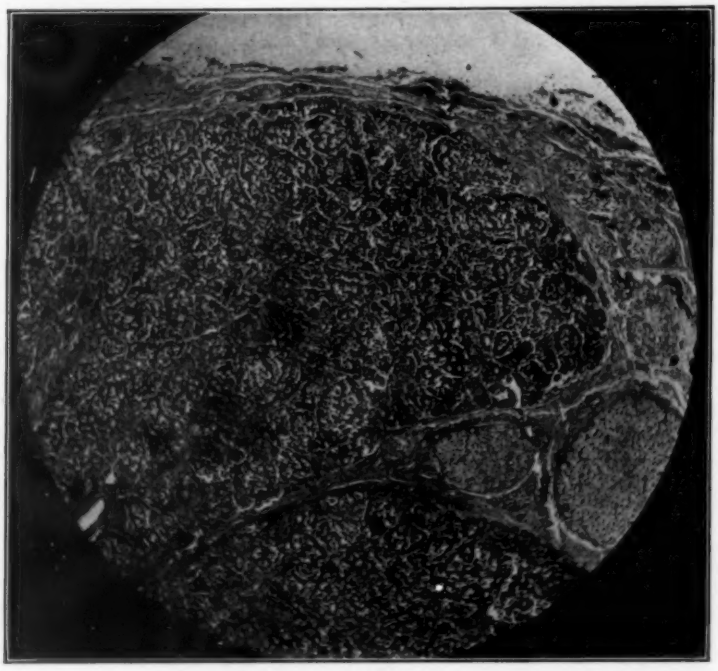

Fig. 6.—Section from head of pancreas from E. B. (Case 8), showing an area composed almost entirely of island tissue.

As Mann[15] has shown experimentally, complete hepatectomy (with, of course, the loss of all the liver glycogen) leads rapidly to complete disappearance of dextrose from the blood and to death. Various types of liver injury, if sufficiently severe, lead to varying degrees of hypoglycemia, presumably chiefly because of varying degrees of loss of liver glycogen.

1. *Diminished Absorption From the Gastrointestinal Tract.*—a. *Starvation:* We have observed fifteen cases of hypoglycemia developing principally because of a failure to ingest sufficient food. In only two instances did it develop in a "normal" infant, who was a "feeding

problem." One refused food offered by the mother at home but took it somewhat better when fed by nurses in the hospital. (This eleven-month-old infant was admitted with a "true" blood sugar of 35 mg. per cent, slightly dehydrated, in ketosis with a carbon dioxide content of only 25 volumes per cent. In one other instance we observed similar dehydration and ketosis with even more severe acidosis, following attempted weaning from the breast.) In another case, two years of age, very little food other than fruit juice was taken over a period of fourteen weeks. A reducing substance was discovered in the urine, and the child was sent to the hospital for a dextrose toler-

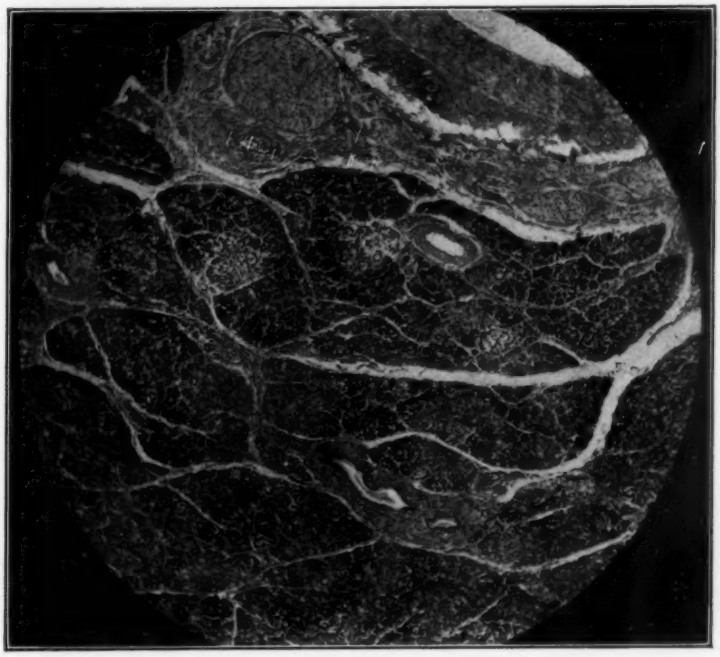

Fig. 7.—Section of pancreas from E. B. (Case 8), showing what is considered to be representative of the average amount of island tissue in the pancreas as a whole.

ance test, the fasting sugar being 41 mg. per cent (C. W. B. T.). The urinary reducing substance was a pentose. In one instance, the lack of food intake occurred in a three-year-old microcephalic idiot. In one case mild hypoglycemia followed tonsillectomy.

In all other cases of this type, the lack of food intake seemed to be the result of marked anorexia associated with acute or chronic severe infections. In all, except the first case cited, the hypoglycemia was of mild degree, without symptoms, and was discovered accidentally during the course of more or less routine blood chemical examinations.

b. *Loss by Vomiting, Diarrhea or Fistula, With and Without Infection (Combination of Diminished Food Intake and Increased Utilization)* (37 cases): In 4 instances vomiting alone was the cause. One was a case of pyloric stenosis (50 mg. per cent W. B. A.), one of intussusception (65 mg. per cent W. B. A.), one of intestinal obstruction from postoperative adhesions (40 mg. per cent W. B. A.), and one of uremia (67 mg. per cent W. B. A.). In 24 cases vomiting or diarrhea or both combined with infection in producing low blood sugars, 6 showing moderate and the rest mild hypoglycemia. The infections included acute bacillary dysentery (5 cases), acute nonspecific diarrhea with parenteral infection (3 cases), pyelitis (5 cases), meningitis (2 cases), and acute respiratory tract infection (8 cases). In 4 cases prolonged infection accompanied by anorexia, vomiting, diarrhea, and malnutrition was responsible for the hypoglycemia. In 2 cases malignant tumors producing cachexia were the cause, and in 3 the hypoglycemia was noted in cases with cardiac decompensation and extensive edema. It is possible that in the last mentioned instances the large amount of intercellular fluid exerts a diluting effect on the concentration of blood sugar, even in the face of normal absorption from the gastrointestinal tract and normal utilization in the tissues.

2. *Liver Abnormalities (Decrease in Glycogen Stores of Mobilization)* (3 cases): In reviewing the blood sugar data in the type of liver damage associated with "acute catarrhal jaundice," quite frequently values were noted very low in the normal zone. It was equally true, however, that not infrequently high normal values were also encountered, indicating inability on the part of the damaged liver to control accurately the blood sugar level through either glycogenesis or glycogenolysis. In one instance, however, a value of 56 mg. per cent (W. B. A.) was encountered. Anorexia was pronounced in this case. In one case terminating fatally and suggestive of "acute yellow atrophy" (high fever, vomiting, delirium, prostration, jaundice with rapid liver enlargement, and early death), a blood sugar level of 40 mg. per cent (W. B. A.) was noted. In the third case, liver damage was the result of salicylate poisoning, the blood sugar falling to 26 mg. per cent (S. T.). Extremely severe ketosis and acidosis also developed, requiring the administration of unusually large amounts of alkali before recovery was completed.

B. Lack of Development or Breakdown of Regulatory Mechanism

1. *Normal Newborn or Premature Infants.*—It has been appreciated for some time[14] that hypoglycemia is a common occurrence in normal newborn infants, as well as in premature infants. The recent development of a micromethod for the determination of "true" blood sugar, which is accurate even in the hypoglycemic zone, has made us consider it important to try to confirm this fact. Our data, plotted in Chart 2, will be discussed later.

2. *Endocrine Imbalance: Adrenal or Pituitary Insufficiency.*—Hemorrhage into the adrenal gland, not a very rare occurrence in newborn infants, might be expected to interfere with the normal discharge of epinephrine into the blood, and in that way to lead to diminished liver glycogenolysis. The following case is confirmatory of such an expectation:

CASE 11.—B. S., a 2,020 gm. premature male infant, was delivered by breech extraction at 6:10 P.M. on Dec. 25, 1933. Contrast baths and aspiration of the trachea were required to establish normal respiration. After this therapy, however, the infant soon appeared normal, and no further difficulty was encountered until the third day of life. At 7:00 A.M. on Dec. 27, 1933, the infant suddenly began to have labored breathing accompanied by twitchings of the facial muscles. No generalized convulsions were noted. The respirations became progressively more irregular, associated with long apneic pauses. The fontanels seemed questionably tense, and accordingly a lumbar puncture was done, but no fluid was obtained. A diagnostic cisternal puncture was then done, and approximately 5 c.c. of clear, slightly xanthochromic fluid was obtained, under questionable pressure. No improvement was noted, and by this time the infant was *in extremis*, gasping at long irregular intervals; however, the heartbeat was of fair quality.

As a final therapeutic measure 10 c.c. of 50 per cent dextrose solution were slowly injected into the superior sagittal sinus, at 9:30 A.M. The effect was dramatic. Before half of the amount was injected, the color improved, respiration began at a regular rate, and the infant cried. The spinal fluid showed nothing abnormal, with the exception of a dextrose content of 20 mg. per cent. The child remained in good condition until 2:45 P.M., approximately five hours after the injection of dextrose, when cyanosis and apnea were again noted. A sinus puncture was immediately done and 10 c.c. of 5 per cent dextrose was again slowly injected. The response was not as prompt as before, but within a few minutes the color was improved and respiration resumed.

Blood for chemical examination taken during this attack revealed a complete absence of blood dextrose, 0 mg. per cent, at 3:00 P.M. on Dec. 27, 1933. The infant remained improved after frequent injections of 5 per cent dextrose solution subcutaneously, but the respirations gradually became weaker, and finally ceased at 4:00 A.M. on Dec. 28, 1933.

The only significant autopsy findings were limited to the suprarenal glands. The following are quotations from the *pathologic protocol:* "The adrenals present a most interesting gross appearance. They appear as large, swollen, hemorrhagic masses of tissue. Their surface is shiny and is deep blood red in color." *Microscopic examination:* "The adrenal structure is entirely distorted by hemorrhage. In fact, the section consists of a great bulk of blood in which the remains of the gland can be seen. The masses of the glandular tissue are recognizable as cortical, because of the large amount of fat present. A few cells which resemble those of the medulla are seen." No abnormality of the pancreas was noted.

In this group are also placed five children (together with the father of one) who are both interesting and important because of their tendency to have *recurrent* attacks of very severe hypoglycemia. Recent experimental studies have shown that when either adrenalectomy or hypophysectomy are performed in animals, a state of insulin hypersensitivity or intolerance results. It is our belief that in the following 5 cases, the recurrent attacks of hypoglycemia developing "spontane-

ously'' were due at least partly to a lack of insulin-opposing secretions, and resemble the adults with pituitary lesions described by Wilder.[15] It is quite likely, however, that reduction in liver glycogen storage also played a rôle in these cases.

CASE 12.—R. R., a three-year-old white male, was first seen at the St. Louis Children's Hospital on July 5, 1930. In March, 1930, the child had had an attack of vomiting, followed by stupor not associated with convulsions. He was asymptomatic until July 4, 1930, at which time he had breakfast and lunch; he then fell asleep before suppertime, and therefore did not have the usual evening meal. He slept until 8:00 A.M. the following day, when the mother found him crouched on his hands, his body rigid, and his mind disoriented. He became unconscious, and was admitted at 12:00 noon in a state of coma. Routine neurologic examination showed a left hemiparesis. There was acute injection of his nose and throat. Two hundred cubic centimeters of 20 per cent dextrose and 13 units of insulin were administered intravenously. The boy immediately revived, but on this admission the initial blood taken for a sugar determination was lost, and hypoglycemia was not suspected. The other blood chemical findings showed a serum carbon dioxide content of 38.3 volumes per cent and a nonprotein nitrogen of 35.5 mg. per cent. The urine was normal, aside from the presence of diacetic acid. Convalescence was uneventful, except for a continued low-grade temperature of eight days' duration, thought to be due to the nose and throat infection.

He was readmitted on Oct. 20, 1931. He had apparently been all right from the time of discharge until Oct. 19, 1931, when he complained of a headache. He partook of only a light supper and went to bed. His sleep was restless, and at 5:30 A.M. on Oct. 20, 1931, he was found in a spell of coughing and vomiting, which was associated with incontinence of bladder and bowel. He could not be aroused at the time, and shortly thereafter generalized convulsive movements began. The convulsions were repeated at short intervals and were associated with frequent vomiting. He was admitted to the hospital at 8:00 A.M. in a stuporous state, with twitchings of the facial muscles. He again showed evidence of infection in the nose and throat, despite the subnormal temperature at 36° C. on admittance. The blood sugar at this time was (S. A.) 32 mg. per cent; the carbon dioxide content was 48 volumes per cent. Three hundred cubic centimeters of 5 per cent dextrose were given intravenously, and the patient began to improve. No diacetic acid was found in the urine. Immediately after the intravenous dextrose administration, the blood sugar was 245 mg. per cent. At 1:30 P.M. the blood sugar was 104 mg. per cent (S. A.).

A dextrose tolerance test was made on Oct. 22, 1931: (S. T.) fasting, 54 mg. per cent; 30 minutes, 70 mg. per cent; 1 hour, 86 mg. per cent; 2 hours, 63 mg. per cent; 3 hours, 50 mg. per cent.

The boy remained symptom-free until July 11, 1932. He had played vigorously the day before. Because of his extreme exhaustion, the evening meal was omitted, and the child was put to bed apparently in a state of normal sleep. At 7:30 A.M. on July 11, 1932, he was found vomiting and in a semiconscious state. He was again brought to the hospital unconscious, with a subnormal temperature, and a tendency to spasticity, this time of the right side of his body. Babinski's sign was positive bilaterally. The blood pressure was 70/30. After administration of intravenous dextrose, consciousness was immediately regained, the temperature returned to normal, and the child soon appeared perfectly all right. A dextrose tolerance test during this admittance was: (W. B. A.) fasting, 112 mg. per cent; 30 minutes, 151 mg. per cent; 1 hour, 138 mg. per cent; 2 hours, 117 mg. per cent; 3 hours, 91 mg. per cent.

He then remained conspicuously free from attacks on a normal diet with a small amount of carbohydrate between meals until the evening of Jan. 28, 1934. At this time the child retired later than usual after eating a light supper. He did not take his orange juice at bedtime as usual. The following morning, after he refused breakfast, he became drowsy. He immediately vomited the orange juice taken at this time, and lapsed into unconsciousness soon after. The blood sugar on admittance was 24 mg. per cent (S. A.), and the serum carbon dioxide content, 37.0 volumes per cent. During intravenous administration of dextrose the child became conscious, and within one-half hour was sitting up in bed, smiling and eating. The following investigations were made: Stereoscopic examination of the skull revealed a normal sella; detailed anatomic measurements were well within normal limits for his age and weight. There was nothing about the patient's physical or mental development suggestive of endocrine disturbance. The liver edge was of normal consistency, and a fluoroscopic examination indicated that it was of normal size for his age and body build. On March 3, 1934, a liver function test revealed a 17 per cent dye retention after one-half hour. His response to epinephrine was studied by determination of blood sugar levels following the administration of 5 minims of adrenalin hydrochloride subcutaneously: (S. T.) before, 56 mg. per cent; 20 minutes after, 84 mg. per cent; 40 minutes, 93 mg. per cent; 1 hour, 10 minutes, 73 mg. per cent; 1 hour and 45 minutes, 54 mg. per cent; 2 hours, 70 mg. per cent. In an effort to determine the normality of the adrenals, daily blood pressure readings were made from Jan. 31 to Mar. 30, 1934; the determinations were made at approximately the same time of day in the early morning and evening; no abnormal variations were noted. The systolic pressure averaged between 90 and 100, and the diastolic between 40 and 60. The boy's muscular strength was well within the normal range. On Jan. 30, 1934, a dextrose tolerance test was made: (S. T.) fasting, 82 mg. per cent; 30 minutes, 121 mg. per cent; 1 hour, 112 mg. per cent; 2 hours, 106 mg. per cent; 3 hours, 75 mg. per cent. There was no evidence of thyroid disturbance, as indicated by a basal metabolism rate of +1 per cent. The skin and the hair were of normal texture. Body development was well within normal limits. The response to insulin was then noted. The boy's weight at this time was 43 pounds, and he was given 5 units of insulin (one-fourth unit per kilogram of body weight). The blood sugar values were: before, 74 mg. per cent; after 20 minutes, 65 mg. per cent; 40 minutes, 33 mg. per cent; 1 hour, 23 mg. per cent; 1 hour and 40 minutes, 19 mg. per cent. At this point the patient had a reaction, characterized by unconsciousness, slow shallow respiration, and rapid pulse. Relief followed the gavaging of 20 per cent dextrose solution. Two other insulin tolerance tests were made, using one-fourth unit per kilogram of body weight, on March 10 and March 12, 1934. In the first test the blood sugar dropped to 18 mg. per cent in 140 minutes after injection, and in the second, to 26 mg. per cent, both times resulting in reactions, the latter one being relieved in 30 minutes by 5 minims of adrenalin. Smaller doses of insulin were then tried, using one-eighth and one-tenth unit per kilogram of body weight, respectively. On March 20, 1934, following the giving of one-eighth unit per kilogram, the blood sugar (S. T.) dropped to 8 mg. per cent within one hour. This was accompanied by a rather severe reaction which was not relieved by adrenalin, but responded to intravenous dextrose.

The blood sugar values following the injection of 2 c.c. of cortin subcutaneously were then studied on April 3, 1934. No response was noted: The control blood sugar (C. W. B. T.) was 61 mg. per cent; 20 minutes following injection, 61 mg. per cent; 40 minutes, 61 mg. per cent; 1 hour, 45 mg. per cent; 1 hour, 40 minutes, 58 mg. per cent. Two cubic centimeters of cortin were then administered for six consecutive days. On April 12, 1934, the day following the last injection, an insulin tolerance test, using one-fourth unit per kilogram, was done. Cortin showed no

tendency to bolster the falling blood sugar, as is evidenced by the following data: Control (C. W. B. T.) 59 mg. per cent; after 20 minutes, 34 mg. per cent; 40 minutes, 13 mg. per cent; 1 hour, 5 mg. per cent. At this point the boy had a severe reaction requiring dextrose intravenously. From Jan. 28, 1934, to April 16, 1934, fifty fasting blood sugar determinations were made: the lowest value was (C. W. B. T.) 30 mg. per cent, highest 98 mg. per cent, and the average, 62 mg. per cent. The child was sent to our convalescent home and placed on an ordinary diet. He was symptom-free until he developed a mild attack of Flexner dysentery during the onset of which he again showed his usual symptoms of hypoglycemia. The remainder of hospitalization was uneventful, and the patient was discharged on Oct. 2, 1934, with instructions to take small amounts of carbohydrate between meals and before retiring.

He was again seen on March 13, 1937, for a follow-up examination. The mother stated that for a year following his discharge from the hospital the boy had frequent "fainting" attacks, associated with marked perspiration and symptoms of collapse. The attacks would last about five minutes and occur at any time of the day. In addition, he was very irritable and hard to manage during this time. For a year, however, he had been quite normal in every respect. His physical and scholastic attainments were normal for a thirteen-year-old. The patient showed no evidence of endocrine disturbance. An insulin tolerance test on March 13, 1937, gave the following results: (One-fourth unit per kilogram being used) before (C. W. B. T.), 74 mg. per cent; after 20 minutes, 61 mg. per cent; 40 minutes, 32 mg. per cent; 60 minutes, 14 mg. per cent; 1½ hours, 9 mg. per cent. A reaction characterized by marked irritability, perspiration and vomiting was noted 40 minutes after the insulin injection. When the blood sugar was 9 mg. per cent there were symptoms of complete collapse and unconsciousness, associated with incontinence of bladder and bowel. Improvement was promptly noted after the intravenous injection of 20 c.c. of 50 per cent dextrose solution. The blood pressure readings before, during and after the reaction were 110/80, 84/60, and 100/76, respectively. On March 25, 1937, a dextrose tolerance test was performed: fasting (C. W. B. T.), 56 mg. per cent; 30 minutes, 122 mg. per cent; 1 hour, 71 mg. per cent; 2 hours, 56 mg. per cent; 3 hours, 36 mg. per cent.

On April 20, 1937, another insulin tolerance test was made after the patient had had two ordinary meals of the day. The blood sugar 1½ hours following the noon meal was (C. W. B. T.) 73 mg. per cent. The usual one-fourth unit per kilogram was given. Twenty minutes after the injection, the blood sugar was 68 mg. per cent; 40 minutes, 56 mg. per cent; 1 hour, 63 mg. per cent; 1½ hours, 56 mg. per cent; 2 hours, 36 mg. per cent, and 3 hours, 31 mg. per cent. No untoward symptoms developed during this test.

CASE 13.—L. C., a white male, four years ten months old, was admitted to the St. Louis Children's Hospital on August 11, 1930, with the following history: In October, 1929, he awoke at 4:00 A.M. screaming. His mother found him rigid, unconscious, and in a generalized convulsion. This lasted from three to five minutes, and was followed by a deep stupor that persisted for three days, during which time there were numerous clonic convulsions. Fever was noted only after the third day. He apparently completely recovered, but in January, 1930, three months later, he had a similar attack, lasting one day. There was another in March, 1930. It is interesting to note that all the seizures began in the early morning hours and were accompanied by vomiting. The last attack started at about 5:00 A.M. on the day of admittance, August 11, 1930, and the boy was brought to the hospital in a stuporous condition. He was found poorly nourished and poorly developed. The extremities were cool and moist. Temperature was 36° C., pulse 90, and respiration slow

but regular. An acute tonsillitis was present, despite the subnormal temperature. Routine laboratory examination was essentially negative, aside from the presence of diacetic acid in the urine. Intravenous dextrose was immediately given, with prompt improvement. On August 16, 1930, the fasting blood sugar (W. B. A.) was 40 mg. per cent.

He was again seen on October 22, 1931, with a history of having been asymptomatic until the day previous to admittance, when he developed a "head cold" with fever, followed by a generalized convulsion early the next day. When admitted, he was still semiconscious and vomiting and presented a picture of collapse. The blood sugar was found to be (W. B. A.) 32 mg. per cent. He was again given intravenous dextrose, and before the injection was complete, he aroused and spoke normally. The dextrose tolerance test revealed: (W. B. A.) fasting, 68 mg. per cent; 30 minutes, 110 mg. per cent; 1 hour, 98 mg. per cent; 2 hours, 84 mg. per cent; 3 hours, 80 mg. per cent.

On Jan. 30, 1932, he was again admitted to the hospital with essentially the same history; namely, the recent occurrence of fever and vomiting, followed by stupor. The blood sugar was 30 mg. per cent (W. B. A.). Five minims of adrenalin were given subcutaneously, and 20 minutes later the blood sugar had risen to 50 mg. per cent. However, the stupor continued, and dextrose was given intravenously with prompt recovery. The dextrose tolerance at this time was: (W. B. A.) fasting, 70 mg. per cent; 30 minutes, 149 mg. per cent; 1 hour, 137 mg. per cent; 1½ hours, 130 mg. per cent; 2½ hours, 110 mg. per cent; 3½ hours, 150 mg. per cent. He was placed on a relatively high carbohydrate diet and was discharged.

He was seen again on Sept. 9, 1934, having apparently been perfectly well until 8:00 A.M. the day of admittance, when he began to vomit. This persisted until 9:00 P.M., when he was found to be lethargic, with generalized muscular twitchings. The temperature was 36.5° C.; skin was cool; acetone was noted on the breath; and there was evidence of acute pharyngitis. The blood sugar was 33 mg. per cent (S. A.), and the plasma carbon dioxide content, 31 volumes per cent. Ten minims of adrenalin were administered, and at 9:30 P.M., 30 minutes later, the blood sugar rose to 48 mg. per cent (S. A.). This was accompanied by a slow recovery from symptoms. On Sept. 13, 1933, a dextrose tolerance test was: (C. W. B. T.) fasting, 52 mg. per cent; 30 minutes, 108 mg. per cent; 1 hour, 155 mg. per cent; 2 hours, 103 mg. per cent; 3 hours, 68 mg. per cent. On Sept. 14, 1934, the adrenalin tolerance (5 minims) test was: before, 51 mg. per cent; after 20 minutes, 109 mg. per cent; 40 minutes, 100 mg. per cent; 1 hour, 81 mg. per cent; 1½ hours, 42 mg. per cent; 2 hours, 39 mg. per cent. On Sept. 17, 1934, an insulin tolerance test was done after the injection of 5 units of insulin (one-fourth unit per kilogram of body weight) with these results: (C. W. B. T.) fasting, 50 mg. per cent; 20 minutes, 44 mg. per cent; 40 minutes, 16 mg. per cent; 1 hour, 12 mg. per cent; 2 hours, 10 mg. per cent. At this point, the patient had a mild reaction but required no specific therapy. On Sept. 19, 1934, the insulin tolerance test was repeated, using about one-eighth of a unit per kilogram body weight. A total of 3 units was given subcutaneously: fasting, 54 mg. per cent; 20 minutes, 48 mg. per cent; 40 minutes, 39 mg. per cent; 1 hour, 35 mg. per cent; 2 hours, 26 mg. per cent. In addition to the findings of hypoglycemia, it was observed that the patient was definitely under the average weight and height for a normal nine-year-old child. There was also evidence of mental retardation. He was sent to our convalescent home for three months, and while there he was placed on an ordinary diet. During this time he had no attacks, gained 8 pounds in weight and ½ inch in height. On Dec. 5, 1934, he was discharged to the out-patient department. He did poorly when away from

the hospital, no doubt in part because of poor parental supervision. He was seen again on Dec. 22, 1934, in the clinic, when it was found he was drinking very little milk and was only occasionally offered fresh fruits and vegetables.

Another follow-up examination was made on March 5, 1937. At this time the mother stated that the child had had no attacks since leaving the hospital; however, on further questioning, it was found that three or four times a week he perspired and became extremely weak and pale during the early morning hours before breakfast. These symptoms were also occasionally noticed after brisk exercise. His appetite had been very poor, and he seemed susceptible to frequent colds and unable to gain weight the past year. His weight was 54½ pounds; height, 51¼ inches; posture, poor; and there was evidence of chronic maxillary sinusitis. The mental retardation was more obvious than previously.

On March 6, 1937, an insulin tolerance test was again done. Seven and one-tenth units were given subcutaneously (one-fourth unit per kilogram): (C. W. B. T.) fasting, 72 mg. per cent; 20 minutes, 13 mg. per cent; 40 minutes, 5 mg. per cent; 1 hour, 13 mg. per cent. At this point 5 minims of adrenalin were given subcutaneously because of the severe reaction. Twenty minutes after the adrenalin, the blood sugar had risen to 29 mg. per cent, 40 minutes to 34 mg. per cent, and 60 minutes to 35 mg. per cent. Twenty minutes after the injection of insulin the child became dizzy, complained of headache, and could no longer stand erect. When the blood sugar was 5 mg. per cent, there was a generalized collapse, characterized by excessive perspiration, pallor, hypotonicity, dilated pupils, slow, weak pulse, nausea, coughing, and yawning. During this reaction, the mother stated that these symptoms were identical with those frequently manifested by the boy. Twenty minutes after the administration of adrenalin, the color improved, the pulse became stronger, and a marked emotional response ensued; the child screamed and clutched his head, and violently resisted attempts to quiet him; at other times he sat perfectly motionless, staring into space. He lapsed again into the collapse state, and was given 20 c.c. of 50 per cent dextrose intravenously with instantaneous recovery. The blood pressure before the test was 110/80; during the reaction it dropped to 80/50 and remained at this level even when he appeared normal following the giving of dextrose intravenously.

The dextrose tolerance test on March 27, 1937, was: (C. W. B. T.) fasting, 68 mg. per cent; 30 minutes, 114 mg. per cent; 1 hour, 81 mg. per cent; 2 hours, 77 mg. per cent, and 3 hours, 50 mg. per cent.

On April 14, 1937, the boy was allowed to eat the morning and noon meals. One and a half hours after the last meal an insulin tolerance test, using the usual one-quarter unit per kilogram, was performed: (C. W. B. T.) before the insulin injection, 94 mg. per cent; 20 minutes later, 74 mg. per cent; 40 minutes, 71 mg. per cent; 1 hour, 60 mg. per cent; 1½ hours, 68 mg. per cent; 2 hours, 65 mg. per cent, and 3 hours, 53 mg. per cent. The blood pressure showed no tendency to drop (remaining between 102 to 110 systolic and 52 to 60 diastolic), nor did the patient reveal any untoward symptoms as previously noted. At this time he was placed on a relatively high protein diet, as recommended by Newburg.[16] According to the father, he gained 3 pounds in a short interval and has been free of symptoms.

CASE 14.—J. H., a three-year-old white male, was admitted to the St. Louis Children's Hospital on Dec. 13, 1936. Three days previously the child had begun to vomit and cough. These symptoms continued without much change until the day before admittance, when he became restless, refused food, and for the remainder of the day, until midnight on Dec. 12, 1936, was extremely listless. At 8:00 A.M. on Dec. 13, 1936, he awakened vomiting and soon became unconscious. He remained in a comatose state all day and aroused only during the attacks of retching. No convul-

sion or fever was noted. The child was thin, dehydrated, and in a comatose state on admittance. He presented intermittent tonic movements of all extremities. The blood pressure was 78/38. The urine was strongly positive for diacetic acid. A lumbar puncture, performed immediately, revealed normal fluid. The blood sugar was 20 mg. per cent (S. A.), and the carbon dioxide content, 33.3 volumes per cent. Two hundred and twenty-five cubic centimeters of 10 per cent dextrose were given intravenously, and immediately following this injection the patient aroused, called for his mother, and forcibly resisted the giving of subcutaneous fluids. The routine laboratory examination was essentially normal. On Dec. 14, 1936, a dextrose tolerance test revealed: fasting (C. W. B. T.), 63 mg. per cent; 30 minutes, 91 mg. per cent; 1 hour, 124 mg. per cent; 2 hours, 138 mg. per cent; 3 hours, 118 mg. per cent.

On Dec. 15, 1936, an insulin tolerance test was performed, using one-fourth unit per kilogram of body weight, with the following results: before, 72 mg. per cent; 20 minutes after, 45 mg. per cent; 40 minutes, 27 mg. per cent; 1 hour, 19 mg. per cent. At this point the patient had a reaction characterized by symptoms of mild collapse, and 5 minims of adrenalin were administered subcutaneously. Thirty minutes later the blood sugar had risen to 29 mg. per cent; 1 hour to 41 mg. per cent; and 1 hour and 45 minutes to 42 mg. per cent.

On Dec. 21, 1936, another insulin tolerance test was performed, using one-eighth unit per kilogram of body weight. The control blood sugar (W. B. T.) was 82 mg. per cent; after 20 minutes, 62 mg. per cent; 40 minutes, 43 mg. per cent; 1 hour, 46 mg. per cent; 1½ hours, 49 mg. per cent; 2 hours, 42 mg. per cent; 3 hours, 48 mg. per cent. At the end of two hours the patient became moderately sluggish and slightly weak, but these symptoms rapidly disappeared.

An adrenalin tolerance test, 5 minims injected subcutaneously, was performed on Dec. 23, 1936, with the following results: control, 156 mg. per cent; after 20 minutes, 125 mg. per cent; 40 minutes, 146 mg. per cent; 1 hour, 156 mg. per cent; 1½ hours, 138 mg. per cent; 2 hours, 105 mg. per cent; 3 hours, 91 mg. per cent. He was discharged on Dec. 24, 1936.

Two weeks after discharge he developed an upper respiratory infection with fever, and omitted breakfast because of a slightly sore throat. Later that morning he began to vomit. He became extremely weak and lethargic. Orange juice was given by the mother, and the symptoms rapidly subsided. Aside from this transient attack, the child has experienced no untoward symptoms from this time on.

He was seen again on April 22, 1937, for a follow-up examination. An insulin tolerance test was done at this time, using one-fourth unit per kilogram of body weight: (C. W. B. T.) control, 102 mg. per cent; after 20 minutes, 74 mg. per cent; 40 minutes, 53 mg. per cent; 1 hour, 47 mg. per cent; 1½ hours, 55 mg. per cent; 2 hours, 52 mg. per cent; 3 hours, 52 mg. per cent. The patient showed no symptoms during the test.

CASE 15.—J. K., a white male, two years of age, was admitted to the St. Louis Children's Hospital on Oct. 8, 1925. Aside from an abnormally large appetite and mild intermittent diarrhea of five months' duration, the patient was apparently normal until the night of Oct. 7, 1925. He cried out in his sleep, suddenly awoke, and jumped out of bed. He seemed confused, restless, and complained of abdominal cramps. At 8:00 A.M. on Oct. 8, 1925, he became stuporous. This was followed shortly by generalized tetanic convulsions which were associated with incontinence of bowel and bladder. The patient had had one similar attack of unconsciousness at seven months of age; this, however, lasted only 15 minutes and was not accompanied by convulsions. When first examined, he was in a comatose state; the temperature was subnormal, 35.5° C. Frequent generalized convulsions asso-

ciated with grinding of the teeth and frothing at the mouth were noted during his first day of hospitalization. The routine blood chemical examination revealed a blood sugar of 40 mg. per cent (W. B. A.), and a carbon dioxide content of 36 volumes per cent. The spinal fluid was essentially normal, aside from a dextrose content of only 20 mg. per cent. The following day the patient was apparently normal, and remained so during the remainder of hospitalization.

He was again seen on Sept. 7, 1926, at three years of age, with the history that twenty-four hours previously irritability and fever were noted. He refused to eat, and he slept very restlessly during that night. At 7:00 A.M. the morning of admittance a generalized clonic convulsion developed and was followed by stupor. The temperature was 35° C. Thorough physical and neurologic examinations failed to explain the comatose state. The blood sugar was 56 mg. per cent (W. B. A.), and the carbon dioxide content, 34 volumes per cent. Wassermann and tuberculin tests were negative. After a twenty-four-hour period of drowsiness, the patient completely recovered. The low blood sugar values were disregarded at this time and a diagnosis of "infantile convulsions" was made. Unfortunately, no follow-up examinations have been made on this patient.

CASE 16.—J. J., a white male, aged three and one-half years, was admitted to the St. Louis Children's Hospital on Nov. 19, 1933, with a history of "spells" since the age of thirteen months. The first attack consisted of a generalized clonic convulsion, associated with high fever, loss of consciousness, followed by drowsiness for two hours and irritability for the next few days. For the following four months he was free from seizures and apparently normal in every respect. Then there was a series of similar attacks, but these were less severe, not associated with loss of consciousness, and with only transient twitching of the extremities. About one year before admittance to the hospital he began to have entirely different "spells." These occurred regularly, about once a month, during which he would suddenly become very "cold to the touch" and then extremely warm and would perspire and manifest a frantic desire to roll, tumble, and throw his body back and forth in bed. During the attack he would remain conscious and apparently could understand what was said to him, but he would resist violently any attempts to pick him up. The attacks usually occurred during the night, approximately three to four hours after retiring. The birth and developmental history was essentially normal. The patient's mother, twenty-eight years of age, had suffered for two and one-half years with severe "migraine type" headaches every other day. The paternal uncle died at the age of two and one-half years, during a convulsion. The paternal first cousin also had convulsions, and the paternal grandmother died of diabetes. Two other siblings, aged one and five years, respectively, were living and well at the time.

The child was mentally and physically alert when first seen. General physical and neurologic examinations were completely negative. The routine laboratory procedures, including x-ray films of the skull and lumbar puncture, showed no pathology. The dextrose tolerance test on Nov. 20, 1933, was: (S. A.) fasting, 67 mg. per cent; 30 minutes, 176 mg. per cent; 1 hour, 165 mg. per cent; 2 hours, 138 mg. per cent; 3 hours, 56 mg. per cent. On Nov. 21, 1933, before breakfast, the patient vomited and appeared slightly drowsy, and the blood sugar taken at this time revealed 33 mg. per cent (W. B. T.). Soon after eating, the symptoms disappeared, and he remained normal for the rest of the day. The dextrose tolerance test performed on Nov. 23, 1933, was: (C. W. B. T.) fasting, 60 mg. per cent; 30 minutes, 160 mg. per cent; 1 hour, 125 mg. per cent; 2 hours, 94 mg. per cent; 3 hours, 70 mg. per cent. The patient's response to 3 minims of adrenalin given subcutaneously on Nov. 24, 1933, was as follows: (C. W. B. T.) before, 79 mg. per cent; after 20 minutes, 135 mg. per cent; 50 minutes, 102 mg. per cent; 1 hour and 20

minutes, 80 mg. per cent; 1 hour and 50 minutes, 68 mg. per cent; 2 hours and 10 minutes, 80 mg. per cent. On Nov. 24, 1933, a small amount of easily assimilated carbohydrate in the form of candy, orange juice, etc., was offered between meals and before retiring. The child seemed more alert following this therapy, and aside from two mild attacks of weakness, associated with excessive sweating, occurring at 1:00 A.M. and 4:00 A.M., respectively, he remained symptom-free apparently from this time on, although we have been unable to get in contact with him recently for a follow-up examination.

3. *Intracranial Anomalies or Injuries.*—In this group are placed six subjects, in several of whom possibly a number of pathogenic factors were operating, but in each of whom an intracranial anomaly seemed the most important. Two of the most interesting cases are reported in some detail.

CASE 17.—B. M., two-day-old, white, male infant, was admitted to the St. Louis Children's Hospital on Feb. 12, 1934, with the following history: He was born one month prematurely by breech extraction at the St. Louis Maternity Hospital. The labor was of four and one-half hours' duration and not especially difficult. The birth weight was 2,340 grams. No history of immediate postnatal apnea or cyanosis. He seemed rather weak and apathetic, as are most premature infants, but nothing unusual was noticed until the evening of the second day. At this time a moderate cyanosis developed, which was accompanied by a definite carpopedal spasm and irregular twitching of the extremities. Carbon dioxide and oxygen inhalations gave immediate relief, but the symptoms recurred, and, because of the possibility of intracranial hemorrhage, he was sent to this hospital. The family history was irrelevant. When first examined the infant was slightly cyanotic and appeared quite weak and listless. The skin was cold and moist, and the hands and feet were very blue. A number of petechial spots were seen over the thighs and in the groin and neck folds. The head showed no abnormalities. The respirations were somewhat irregular and rapid. There was no evidence of atelectasis or cardiac pathology. The coagulation and bleeding times were normal. Diagnostic lumbar puncture revealed dark viscous blood which at the time was thought to be due to trauma. The blood sugar taken at 4:30 P.M. on Feb. 12, 1934, revealed 18 mg. per cent (C. W. B. T.). By 5:00 P.M., after the administration of dextrose solution subcutaneously, the color was much improved. By 6:00 A.M. on Feb. 13, 1934, the infant was crying when disturbed, and was taking breast milk and 5 per cent karo water feedings quite well. At 9:15 A.M. the blood sugar was 34 mg. per cent (C. W. B. T.); at 6:15 P.M. that day he again had an attack of cyanosis and generalized twitching of the extremities, more marked on the left side of the body. Two or three similar attacks occurred during that day. Intramuscular injection of blood and frequent subcutaneous administrations of dextrose solution were given. The color remained good, and he took all feedings fairly well on Feb. 14, 1934. The blood sugar on Feb. 16, 1934, was 55 mg. per cent (C. W. B. T.).

From Feb. 18, 1934, to Feb. 24, 1934, the blood sugar ranged from 48 to 60 mg. per cent (C. W. B. T.). During this time the symptoms reappeared; these were similar to those previously noted.

Because of the continuance of these attacks in the face of approximately normal blood sugar values, it was thought the hypoglycemia was associated with intracranial hemorrhage. Suprarenal hemorrhage was also considered. An adrenalin tolerance test was done on Feb. 23, 1934, with the following results: (C. W. B. T.) fasting, 48 mg. per cent; 20 minutes after subcutaneous injection of 3 minims, 58 mg. per

cent; 40 minutes, 70 mg. per cent; 1 hour, 100 mg. per cent; 1½ hours, 123 mg. per cent; 2 hours, 125 mg. per cent. Despite the blood sugar elevation as the result of adrenalin administration the patient showed no improvement.

On March 4, 1934, 1 c.c. of cortin was given intramuscularly. The blood sugar before injection was 61 mg. per cent (C. W. B. T.); 20 minutes after, 55 mg. per cent, and it remained at that figure for the following two hours. The patient's course was uneventful, aside from a temporary period when the feedings were given by gavage. He was discharged on March 31, 1934, weighing 2,830 grams.

He was readmitted on May 5, 1934, at the age of three months, with the history of cough and fever of two days' duration. He was acutely ill, with a temperature of 38.5° C., and presented definite findings of lobar pneumonia. He lost ground steadily and succumbed on May 9, 1934. The blood sugar was 78 mg. per cent.

Careful gross and microscopic examinations of the suprarenals and pancreas failed to reveal any abnormality. There was evidence of an old birth hemorrhage. The dura everywhere showed patches of deep brown pigmentation, and the meninges were yellowish in color, but nothing unusual was seen in the brain.

CASE 18.—M. P., was admitted to the St. Louis Children's Hospital on May 9, 1933, at the age of twelve months, because of recurring attacks of convulsions. She apparently had been born spontaneously without any difficulties, weighed 9 pounds, and had continued to be well until three months of age, when the first convulsion occurred, involving, it was said, only the upper extremities. At seven months of age she had a second convulsion, more severe, beginning in the right leg and progressing to the right arm and right side of the face. The day before admittance there was a series of six convulsions, also chiefly involving the right side of the face, the majority lasting only two to four minutes; one, however, lasted for nearly an hour. Examination revealed a cheerful, flabby, hypotonic baby, whose head was slightly larger than normal, the anterior fontanel being widely open but not tense. Four incisor teeth were present. Normal reflexes were elicited. She could not hold her head up for more than a brief moment and, of course, could not sit alone, stand or walk. She apparently could not talk either, and the general impression was that she was definitely mentally deficient. She was studied very carefully, and it was noted that (1) when on a regular infant diet, her blood sugar values (C. W. B. T.) varied from 6 to 58 mg. per cent, and symptoms of hypoglycemia continued frequently to be present; (2) when she was on a high carbohydrate diet, the blood sugar (C. W. B. T.) varied from 47 to 229 mg. per cent, and occasionally glycosuria was noted; and (3) when she was on a regular infant diet and given anterior lobe pituitary extracts, the blood sugar varied from 10 to 46 mg. per cent. It was also shown that liver glycogen was present and could be easily mobilized by epinephrine. A pancreatic tumor was suspected in this case after these studies and was looked for, but not found. After removal of about six-sevenths of the pancreas, a transient period of hyperglycemia and glycosuria resulted, and then the blood sugar levels remained normal. Careful examination of the resected portion of the pancreas failed to reveal either tumor, hyperplasia or hypertrophy, the tissue looking quite normal. At the date of this writing the child continues to do well in all respects, except that she is still backward mentally. We did not investigate the effect of insulin in this case, and perhaps she really was of the type described under "Relative Hyperinsulinism: Endocrine Imbalance, Adrenal or Pituitary Insufficiency," and not the type in whom the hypoglycemia was the result of intracranial injury.

4. *Moribund State.*—In this group are placed six patients in whom a combination of pathogenic factors, such as diminished food intake

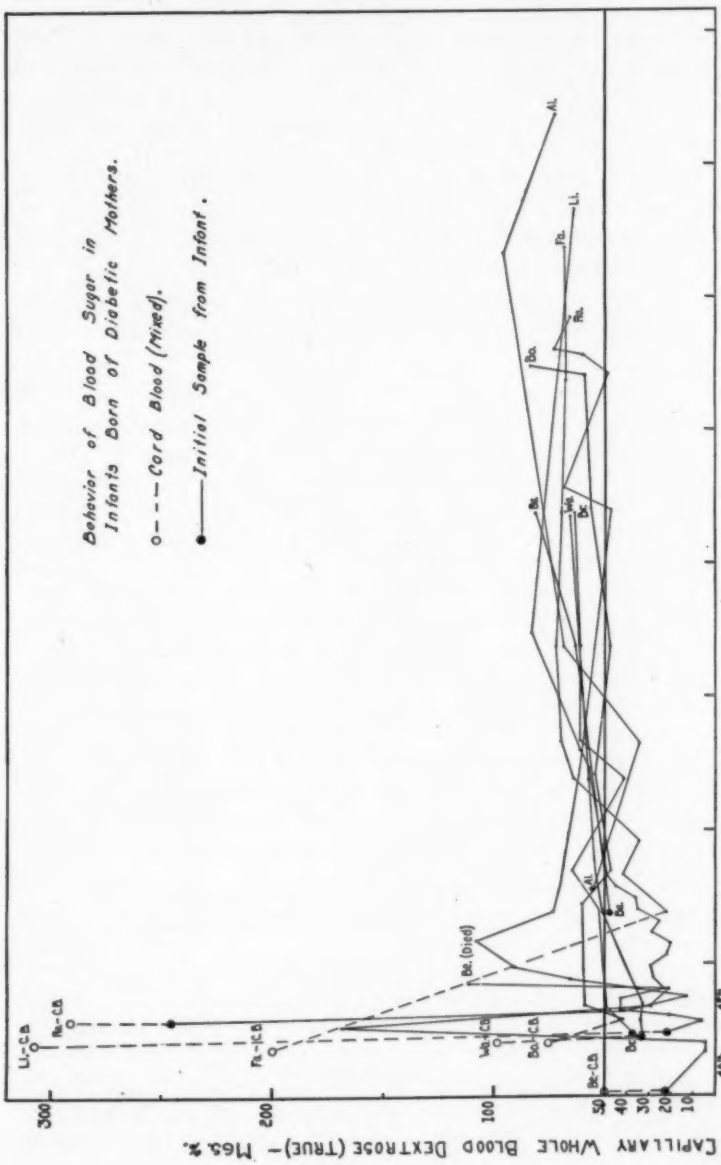
Behavior of Blood Sugar in Infants Born of Diabetic Mothers.
o- - - Cord Blood (Mixed).
●——Initial Sample from Infant.
CAPILLARY WHOLE BLOOD DEXTROSE (TRUE) - Mg%.
DAY OF LIFE.

Chart 1.—Behavior of blood sugar in infants born of diabetic mothers.

or absorption, increased metabolism, liver and brain injury, must have been operating to produce a general breakdown of blood sugar regulation. They were all infants or children dying chiefly from infection. Blood sugars in all three hypoglycemic groups (mild, moderate and extreme) were encountered.

III. CRYPTOGENIC (12 CASES)

Under this heading are placed 12 cases in which the etiology of the hypoglycemia is obscure. They represent cases of hypoglycemia by definition only, having had no clinical manifestations and being discovered during more or less routine blood examinations. All were *mild* cases, i.e., the observed blood sugars fell into the zone of 40 to 50 mg. per cent "true" sugar. In only one was a second blood sugar sample found low.

COMMENT

There was a serious question in our minds whether the infants born of diabetic mothers should have been classified as cases of hyperinsulinism due to islet cell hypertrophy or hyperplasia, or to simple physiologic hyperactivity. In the case of B. C., the autopsy findings (Fig. 4) leave no doubt as to the presence both of islet cell hyperplasia and hypertrophy. It is true that different portions of the pancreas of normal newborn infants vary very much in their histologic pictures (Figs. 2 and 3), as regards the number and size of islands of Langerhans. One can usually without difficulty find areas either very rich in islet tissue or very poor. In B. C., however, *all* portions of many sections were very much alike and resembled closely the area reproduced in Fig. 4. This was true also of the other case (B. B.) of hyperplasia (whose mother was not diabetic). Furthermore, the behavior of the blood sugar of normal newborn infants is very much like that of the majority of infants born of diabetic mothers

TABLE I

INSULIN TOLERANCE TESTS IN NEWBORN INFANTS

SUBJECT	DAY OF LIFE OR AGE	MG. PER CENT BLOOD SUGAR							REMARKS
		BEFORE	AFTER 20'	AFTER 40'	AFTER 60'	AFTER 90'	AFTER 120'	AFTER 180'	
					Normal Infants				
B.	6th	61	36	21	21	26	26	21	C.W.B.T. ¼ U. per kg.
M.	7th	62	54	26	20	24	20	29	C.W.B.T. ¼ U. per kg.
G.	1st	41	36	36	26	22	13	13	C.W.B.T. ¼ U. per kg.
					Infants Born of Diabetic Mothers				
R.	9th	56	51	27	10	8	10	12	C.W.B.T. ¼ U. per kg.
W.	4th	65	60	21	21	13	15	13	C.W.B.T. ¼ U. per kg.
F.	3 yr.	81	54	28	46	45	38	–	C.W.B.T. ¼ U. per kg.
B.	3 yr.	63	44	35	32	42	41	41	C.W.B.T. ¼ U. per kg.

(Charts 1 and 2); i.e., there is a very marked tendency in both groups for a fall deep into the hypoglycemic zone to occur during the first day of life, and for subnormal values to persist for several days—in fact, for even longer in the normal infants. There can be no question, however, of the greater tendency in the abnormal group to develop extreme grades of hypoglycemia with clinical manifestations severe enough to be fatal (Case B. C.) or so alarming as to require constant watching and sometimes frequent treatment to raise low blood sugar levels (Cases B. Fa., B. Ba., B. Li., B. Be., and B. Ra.). This was true in six of the fifteen infants born of diabetic mothers whom we have followed. On the other hand, the frequent occurrence in the normal

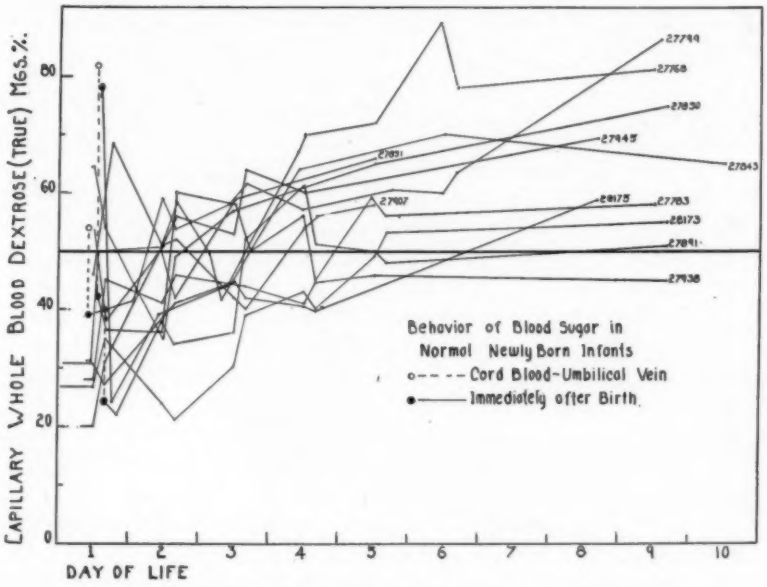

Chart 2.—Behavior of blood sugar in normal newborn infants.

newborn infants of cyanosis, irritability, listlessness, and muscular disorders, such as hypotonicity, hypertonicity, and twitchings, might very well be due sometimes to hypoglycemia which is almost a "normal" occurrence during the first few days of life. Insulin tolerance tests shortly after birth in such infants suggest that hypoglycemia develops principally because of an incompletely developed opposition to insulin activity (Table I).

The apparent complete recovery from the tendency to become hypoglycemic after the first two or three days of life on the part of the infant born of a diabetic mother also speaks against real islet cell

hypertrophy or hyperplasia, and, as may be noted from the protocols of such cases, later tests with dextrose and insulin showed these infants to be quite normal, except for possibly a tendency for the blood sugar to dip a little too low three hours after the ingestion of dextrose.

It does not seem altogether impossible, however, for a regulatory mechanism to develop which might completely compensate for an actual hyperplasia or hypertrophy. It would be of interest to note whether or not such infants excrete abnormally large amounts of insulin into the urine, both shortly after birth and later.

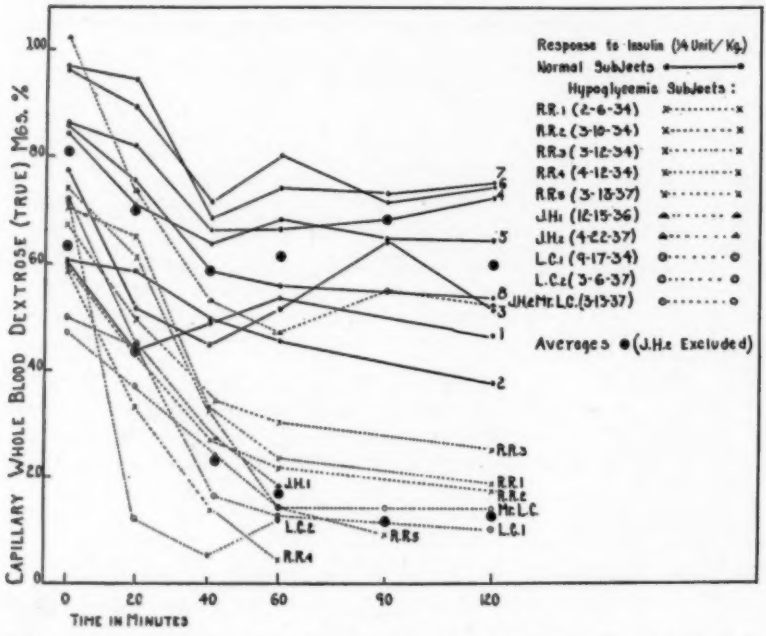

Chart 3.—Response to insulin (¼ unit per kilogram of body weight) in normal subjects and patients with recurring attacks of hypoglycemia.

Regardless of the exact mechanism producing hypoglycemia in such infants, it remains extremely important to watch them very carefully for the first four or five days of life. Death from hypoglycemia should not occur if proper use is made of (1) the very early institution of regular feedings of milk and sugar water between feedings, and (2) the proper use of epinephrine and dextrose administered parenterally in cases of emergency.

It might be added that our own experience with such infants has not as yet entirely convinced us of the desirabilty of delivering them by cesarean section and sterilizing the mothers at the time, a procedure which has been recently highly recommended.[17]

The group of subjects with recurrence of very severe hypoglycemic symptoms, classified under the heading, "Relative Hyperinsulinism—Endocrine Imbalance: Adrenal or Pituitary Insufficiency," is also both a most interesting and puzzling one. In addition to the tendency for the recurrence of convulsions and periods of unconsciousness, the most important finding is their sensitivity or intolerance to insulin during periods between attacks. The difference in this respect from normals is indeed most striking (Chart 3, Table II) and apparently of considerable diagnostic value during symptomless periods. Theoretically, such insulin hypersensitivity could be the result of a lack of (1) storage of liver glycogen, or (2) proper opposition to insulin activity by epinephrine or anterior pituitary hormone by causing mobilization of liver glycogen. Careful examination of the findings in these cases favors both explanations and points to the probability of several causative factors. Apparently the usual immediate exciting cause of hypoglycemic attacks is a combination of decreased food intake (anorexia), food loss (vomiting), and unusual energy expenditure (hyperactivity or fever), which suggests strongly that a lack of liver glycogen may be the chief etiologic factor. The frequent occurrence of ketosis (and acidosis) is also in keeping with this explanation.

On the other hand, the failure of blood pressure to rise as the blood sugar continues to fall in response to injected insulin and the fact that the injection of epinephrine usually increases the blood sugar quite well (Tables III and IV) suggest that after all there may be liver glycogen present which is not mobilized properly. It should be noted, however, that the effect of epinephrine in this respect varies under different conditions: when administered alone, there is usually a good increase in blood sugar; when given after insulin has produced extreme or moderately severe hypoglycemia, the response is not nearly so marked. More control experiments with normal subjects given both insulin and epinephrine are needed to evaluate the significance of such variable responses to adrenalin. The fault may not be entirely in the adrenal gland, however, but may also include the pituitary, since apparently a hormone from this gland is necessary to render epinephrine properly effective in mobilizing glycogen. It must be admitted, however, that except for the small size of L. C., there have been no other findings suggestive either of pituitary or adrenal insufficiency.

The hypersensitivity to insulin administration was still present in two of these cases (L. C. and R. R.) when checked three years after the first examination, and the histories of these cases suggest that the condition was present for some time before we saw them. It is also very interesting that the father of one resembles his offspring in many particulars (Chart 3).

TABLE II

INSULIN TOLERANCE TESTS ON SUBJECTS WITH RECURRING ATTACKS OF HYPOGLYCEMIA

SUBJECT	DATE	MG. PER CENT BLOOD SUGAR							REMARKS
		BEFORE	AFTER 20′	AFTER 40′	AFTER 60′	AFTER 90′	AFTER 120′	AFTER 180′	
L. C.	9/17/34	50	44	16	12	-	10(R)	-	¼ unit per kg.
	9/19/34	54	48	39	35	-	26	-	⅛ unit per kg.
	3/ 6/37	72	13	5(R)	12	Adrenalin administered			C.W.B.T. ¼ unit per kg.
	4/14/37	94	74	71	60	68	65	53	C.W.B.T. ¼ unit per kg. Insulin given 1½ hr. after 2nd (noon) meal of day.
Mr. L. C.	3/13/37	47	37	24	14	14	14	19	C.W.B.T. ¼ unit per kg.
R. R.	2/ 6/34	74	65	33	23	-	19(R)	-	C.W.B.T. ¼ unit per kg.
	3/10/34	59	44	26	22	-	18(R)	-	C.W.B.T. ¼ unit per kg.
	3/12/34	68	49	35	30	-	25(R)	-	C.W.B.T. ¼ unit per kg.
	3/20/34	39	18	12	8(R)	-	-	-	C.W.B.T. ¼ unit per kg.
	3/22/34	51	39	33	26	-	23(R)	-	C.W.B.T. $\frac{1}{10}$ unit per kg.
	4/12/34	59	34	13	5(R)	-	-	-	C.W.B.T. ¼ unit per kg.
	3/13/37	74	61	32	14	9(R)	-	-	C.W.B.T. ¼ unit per kg.
	4/20/37	73	68	56	63	56	36	31	C.W.B.T. ¼ unit per kg.
J. H.	12/15/36	72	45	27	19(R)	Adrenalin administered			C.W.B.T. ¼ unit per kg.
	12/21/36	82	62	43	46	49	42	48	C.W.B.T. ⅛ unit per kg.
	4/22/37	102	74	53	47	55	52	52	C.W.B.T. ¼ unit per kg.

(*R*) indicates severe insulin reaction requiring suspension of test and restorative treatment.

TABLE III

ADRENALIN TESTS ON SUBJECTS WITH RECURRING ATTACKS OF HYPOGLYCEMIA

SUBJECT	DATE	MG. PER CENT BLOOD SUGAR						REMARKS
		BEFORE	AFTER 20′	AFTER 40′	AFTER 60′	AFTER 90′	AFTER 120′	
L. C.	9/14/34	51	109	100	81	42	40	C.W.B.T. 5 minims adrenalin HCl
	3/ 6/37	13	29	34	35	–	–	C.W.B.T. 5 minims adrenalin HCl Cut 60′ period of insulin tolerance
R. R.	3/ 1/34	56	84	93	73(70′)	54(95′)	70(140′)	C.W.B.T. 5 minims adrenalin HCl
	3/12/34	25	32	27	–	–	–	C.W.B.T. 5 minims adrenalin HCl (After reaction during insulin tolerance test)
K. K.	3/20/34	8	12	5(R)	–	–	–	C.W.B.T. 3 minims adrenalin HCl
	3/22/34	23(R)	25(R)	–	–	–	–	(After reaction during insulin tolerance test)
V. H.	12/15/36	19(R)	29(30′)	–	41	–	42	C.W.B.T. 5 minims adrenalin HCl (After reaction during insulin tolerance test)
J. H.	12/23/36	95	125	147	157	138	105	S.T. 5 minims adrenalin HCl
J. J.	11/24/33	79	135	102	79	68	79	C.W.B.T. 3 minims adrenalin HCl

(*R*) indicates presence of hypoglycemic symptoms.
(′) indicates time in minutes when different from the times indicated by the table headings.

TABLE IV

ADRENALIN TESTS ON SUBJECTS WITHOUT RECURRING ATTACKS OF HYPOGLYCEMIA

SUBJECT	DATE	MG. PER CENT BLOOD SUGAR						REMARKS
		BEFORE	AFTER 20′	AFTER 40′	AFTER 60′	AFTER 90′	AFTER 120′	
M. C.—4 yr. Nephrosis, during remission	3/ 8/34	74	108	106	88	88	80	C.W.B.T. 5 minims adrenalin HCl
N. V.—7 yr. Rheumatic heart disease, compensated	7/17/34	83	94	123	123	107	94	S.T. 3 minims adrenalin HCl
R. R.—5 yr. Rheumatic heart disease, decompensated	3/ 8/34	66	71	76	63	54	56	C.W.B.T. 3 minims adrenalin HCl
B. M.—13 days Intracranial birth hemorrhage	2/23/34	51	68	75	101	123	129	C.W.B.T. 3 minims adrenalin HCl
M. P.— Persistent hypoglycemia (interference with regulatory center?)	6/29/33	32	67	84	99	–	57(385′)	C.W.B.T. 3 minims adrenalin HCl
	6/30/33	59	104	114	113	113	113	C.W.B.T. 3 minims adrenalin HCl
Infants of diabetic mothers: B. L.—first day	1/28/37	6(R)	21(30′)	–	–	–	43(105′)	C.W.B.T. 3 minims adrenalin HCl
R. R.—ninth day	5/20/37	49	60	73	–	–	–	C.W.B.T. 3 minims adrenalin HCl
B. W.—fourth day	5/24/37	13	46	51	70	–	–	C.W.B.T. 3 minims adrenalin HCl during insulin tolerance test

(*R*) indicates presence of hypoglycemic symptoms.

(′) indicates time in minutes when different from the times indicated by the table headings.

It was mentioned before that adenomas or other pancreatic tumors must be extremely rare in infants and children, since apparently only one has been reported in the literature. Laparotomies have been performed, however, in the hope of finding such tumors, and sometimes partial or subtotal resections of the pancreas have been made with the hope of relieving permanently hypoglycemic symptoms. It seems to us that before patients are subjected to such operations, the following points should first be established:

1. There should be *proof* of more or less persistent or frequently recurring hypoglycemia by actual blood analyses by a suitable method.

2. It should be shown that the symptoms expected to be relieved by surgery can be relieved by dextrose administration intravenously.

3. It should also be shown that the symptoms cannot be relieved by conservative measures of diet regulation.

4. In the case of recurrent attacks of hypoglycemia with normal intervals between attacks, it should be shown that one is not dealing with the insulin intolerant or hypersensitive type described in this paper as due to lack of opposing secretions.

SUMMARY AND CONCLUSIONS

An analysis has been made of all cases of hypoglycemia studied in the St. Louis Children's Hospital over a period of fifteen years (286 cases). Pathogenesis and classification on an etiologic basis have been emphasized, together with data obtained particularly from three groups: (1) normal newborn infants, (2) infants born of diabetic mothers, and (3) children developing recurring attacks of very severe hypoglycemia, who seem to be insulin hypersensitive or intolerant, chiefly because of the lack of proper opposing secretions (adrenal and pituitary). The conclusions which have been reached are:

1. Hypoglycemia during the first four or five days of life occurs quite regularly in normal newborn infants and seems due to an imperfectly developed regulatory mechanism which creates a state of relative hyperinsulinism.

2. A similar period of hypoglycemia with the development occasionally of such very severe manifestations as convulsions and collapse occurs in infants born of diabetic mothers. The greater fall in blood sugar in such infants (sometimes with a striking absence of symptoms) seems more often referable to an increased physiologic hyperactivity of the islands of Langerhans than to the development of islet cell hypertrophy or hyperplasia, and may be prevented or controlled quite effectually by the combined use of epinephrine and dextrose injection as emergency measures, and the prophylactic starting of complemental milk and carbohydrate feedings immediately after birth. The most careful observation of such infants for the first four or five days of life (with special nurses, if possible) seems almost necessary.

3. The natural tendency to the development of hypoglycemia in the first few days of life may be greatly intensified also by adrenal and intracranial hemorrhage.

4. The demonstration of intolerance or increased sensitivity to insulin in subjects who have recurring attacks of severe hypoglycemic symptoms seems of considerable diagnostic value during symptom-free intervals. There is some reason to believe that in such cases the susceptibility to hypoglycemia is familial.

REFERENCES

1. Shaffer, P. A., and Ronzoni, E.: Annual Review of Biochemistry, Vol. I, Stanford University, Calif., Stanford University Press, p. 247, 1932.
2. Harris, S.: Ann. Int. Med. 7: 1084, 1934.
3. Wauchope, G. M.: Quart. J. Med. 2: 117, 1933.
4. Shaffer, P. A., and Hartmann, A. F.: J. Biol. Chem. 45: 365, 1921.
5. Shaffer, P. A., and Somogyi, M.: J. Biol. Chem. 100: 695, 1933.
6. Somogyi, M.: J. Biol. Chem. 75: 31, 1927.
7. Somogyi, M.: J. Biol. Chem. 78: 117, 1928.
8. Somogyi, M.: J. Biol. Chem. 86: 655, 1930.
9. Somogyi, M.: J. Biol. Chem. 90: 725, 1931.
10. Himsworth, H. P.: Clin. Sc. 1: 1, 1933.
11. Himsworth, H. P.: Clin. Sc. 2: 67, 1935.
12. Gray, S. H., and Feemster, L. C.: Arch. Path. & Lab. Med. 1: 348, 1926.
13. Wolf, A., Hare, C. C., and Riggs, H. W.: Bull. Neurol. Inst. New York 3: 232, 1933.
14. Schretter, G., and Nevinny, H.: Ztschr. f. Geburtsh. u. Gynäk. 98: 258, 1930.
15. Wilder, J.: Deutsche Ztschr. f. Nervenh. 112: 192, 1930.
16. Newburg, L. H., and Conn, W.: J. Clin. Investigation 15: 665, 1936.
17. Randall, L. M., and Rynearson, E. H.: J. A. M. A. 107: 919, 1936.

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DIVERSE ATTRIBUTES OF HEALTHY CHILDREN

A Report of Progress in Understanding the "Normal Child"

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Denver, Colo.

DURING recent years there have been an increasing number of publications from individuals and institutions engaged in the study of the so-called "normal child." A review of even the most significant part of this literature would occupy a very sizable volume. To cover completely the broad subject which I have chosen, I ought, rightly, to present not only such a review but also a survey of the many interesting child study institutes in this country which have been developing during the last two decades. I have been asked, however, by your committee to present the work of the Child Research Council of Denver. Therefore, I shall take the liberty of neglecting completely the literature and the many fascinating contributions of other child study institutes even though, in many instances, they may have contributed directly or indirectly to our own studies.

The Child Research Council is an independent institute engaged in a longitudinal study of a group of average children of its community. Each child is being followed from birth to maturity by a council of physicians and scientists representing the various medical, biologic, and social sciences. While the growth and development of each child is being investigated from many aspects, the emphasis of all these studies is placed upon increasing our understanding of the child himself as a whole integrated living organism. Such a program calls for a considerable shift in the traditional attitude and interests of the participating medical and science groups. Each of the sciences may be regarded as an instrument for the more adequate study of this broader problem of understanding the individual child during the rapid changes and vicissitudes of the early years of life. Instead of concentrating on their own problems, using a child as a means of building up data, they lend their knowledge and skill to this joint enterprise involving workers in many different fields, all pooling and comparing their data on a given child. I believe that this point of view is a matter of some importance to the practicing pediatrician. To diagnose and treat the sick child successfully, he must consider the child himself as the main problem rather than the disease, interesting as that may be. He must have reliable standards first and then have a knowledge of what sort of child

From the Child Research Council and the University of Colorado School of Medicine.
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Bill is before interpreting a basal metabolism of +15 per cent. Moreover, the wise clinician knows that John and Jane, though they both have scarlet fever, may react very differently to the same disease acquired from the same source. Or again he realizes that it will not help him very much to know the percentage incidence of heart involvement in deciding whether Jimmie—who has acute rheumatic fever—will develop carditis or not. He must know a great deal about Jimmie as well as about rheumatic fever, and even then he will be wrong a good many times. One reason for our inadequacy in estimating the course of such a case is to be found in our ignorance concerning the individual and the fundamental characteristics which determine his own peculiar reactions to his environment. Adequate studies of the life cycle of human organisms to fill in these gaps in our knowledge have been most notable by their absence. Curiously enough this is in sharp contrast to the numbers and completeness of life cycle studies of plants and animals by which so much useful information leading to their betterment has been acquired. It is this gap in our knowledge of children which the Child Research Council is trying to fill by persistent and painstaking study of each of 100 children from the time each boy or girl is born until he or she is grown.

In our own quarters in a wing of the School of Medicine of the University of Colorado we are equipped and staffed to carry out the following studies on each child at regular intervals throughout his growth period: complete physical examinations; special examinations of eyes, upper air passages, lungs, heart, bones, muscles, and posture; a complete dental study; a complete anthropometric study; face and full-length photographs; roentgenograms of head, heart, lungs, sinuses, teeth, long bones, and joints; electrocardiographic studies; exercise tolerance and blood pressure investigations; and determinations of the basal metabolic rate. In addition to these procedures, there is a yearly check-up of the child's intelligence quotient by a psychologist and of his behavior by a psychiatrist, together with a more frequent following of the child at home, playing with the neighborhood gang, in school or music class, etc. This latter follow-up is in charge of a full-time research fellow whose entire time is spent in attempting to give us a picture of the individual's life at home and in the community. For ours is not an institutional or out-patient group but a rough sampling of the population of the community such as any one of you might have in your own practice. Supplementing these direct observational studies and permanent objective measures, we have a number of studies of institutional babies and children. And, finally, we have a group of laboratory investigations in progress in conjunction with the various science departments of the School of Medicine, from whose staffs we have received splendid cooperation. Such special pieces of research shed light on many

problems which cannot possibly be solved by any number of observations of the hundred children whom we follow at three-month intervals.

It must be obvious that sound conclusions concerning individual characteristics and their significance for the development and for the present and future health of the particular child cannot be formed until such a group of individual children has been followed from the time of birth up to the age of eighteen or twenty years. Although the Child Research Council was founded ten years ago, the present complete studies did not start until 1932 when the reorganization of the institute, started in 1930, was completed. Thus we have now a rather complete follow-up for only five years. However, the accumulation of data during this period has brought to light certain general trends which seem interesting and well worth talking about. Moreover, repeated determinations and measurements on this small group of children yield data which

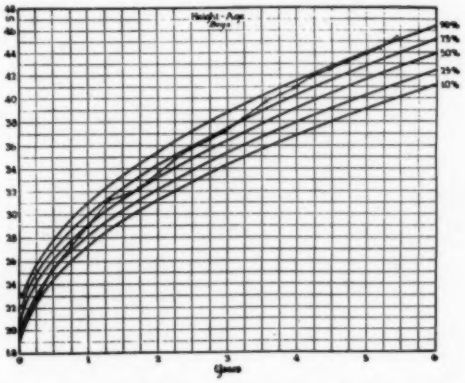


Fig. 1.—Reproduction of Grandprey's chart [1,2] for height referred to age in boys from 0 to 6 years of age. The irregular line represents growth in height of a boy in the Child Research Council series.

may be useful in serving as normal standards. I am sure you are all familiar with the fact that normal standards for growing children—whether we are dealing with height and weight or with heart size or with the number of blood cells or, indeed, with any other finding—cannot be thought of as single figures or as a straight line on a chart showing the various age levels. Rather, adequate standards for determining health must be visualized as broad zones within which individuals may vary, without necessarily indicating the presence of disease or disorder. The charting of this zone of healthy variation may be considered as the chief task of the Child Research Council.

In the series of illustrations which follows, I shall attempt to depict some of these general trends, as well as to suggest the type and character of useful information which is being accumulated. It is, of course, impossible in the time at my disposal to trace the progress being made in

each one of the many studies being carried out on each of 100 children. I hope, however, that the nature of our progress in the several investigations which I have chosen as examples will serve as an adequate index of the general program which we are carrying forward.

We might start with measurements of height and weight, a subject familiar to all of us. In Fig. 1 I have reproduced one of Grandprey's charts[1] representing the figures given by Woodbury[2] for single measurements on 172,000 children. This chart shows the range in height for the boys in this series. It assumes that in such a cross-sectional series of measurements the uppermost 10 per cent and the lowest 10 per cent should be left out in depicting the possible range in height or weight of average healthy children. It gives an accurate picture of the distri-

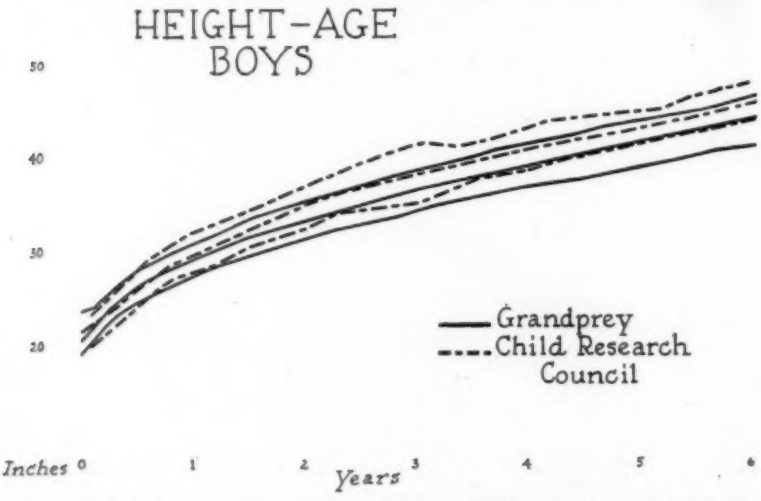


Fig. 2.—Height range and average line from Grandprey's chart (solid lines) compared with height range of boys in the Child Research Council series (broken lines).

bution of heights above and below the average line and serves as an excellent standard against which to chart the height of any given individual child (Fig. 1). In the next illustration (Fig. 2) the solid black lines show the range and average figures for height which you have just seen in Grandprey's chart, while the broken lines show the range and average of the heights of the boys in the Child Research Council series. You will note that the range of heights in our series is of about the same width but at a slightly higher level. Both these points are of some interest. That repeated measurements over a period of four years on fewer than 50 boys should give approximately the same range as single measurements on approximately 80,000 children suggests at once the value and probable reliability of such a longitudinal type of study and offers to the clinician a means of contributing data of great value

if he will but follow his cases from year to year with careful records. Years ago Sir James McKenzie pointed out the opportunity awaiting the clinician who would keep a careful follow-up of even a small group of cases from childhood on through any considerable portion of their life span. Since this has been one of my favorite quotations for some years, I was delighted recently to see a reference to this same statement of McKenzie by Dr. Joseph Brennemann. The fact that our series shows a slightly higher level than Grandprey's is merely evidence that in your practice today you may expect to find a range in both height and weight (Fig. 3) which is slightly higher than that shown in most of the standards of the past. Perhaps if we dealt with the least privileged children in our community we would find a lower limit to our

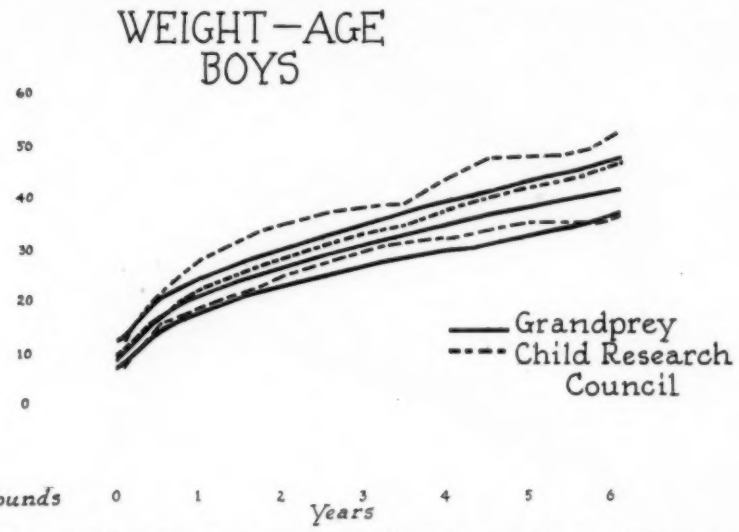


Fig. 3.—Weight range and average line from Grandprey's chart (solid lines) compared with weight range of boys in Child Research Council series (broken lines).

range comparable to that of Grandprey's chart. You will note in Fig. 3 that the chart for weight referred to age is quite similar to that for height.

In the next two charts (Fig. 4 and 5) is shown a comparison between the growth of the trunk, arms, and legs in our group of boys. The rapidity of increase in leg length during this period of years is quite apparent. By charting out in a similar manner the growth of the various parts of the body as represented by some fifty measurements of lengths, diameters and circumferences on each of 100 children we can build up a most interesting picture of the way the body grows in different individuals. Such an analysis shows also the different types of body build encountered at different age levels. The correlation of some of

these measurements with such things as heart function, blood counts, basal metabolism, and reaction to diseases offers fascinating possibilities. In addition, this study may be considered as an attempt to work out accurate measures of some of the individual characteristics of body build—characteristics leading to the so-called "hunches" which experi-

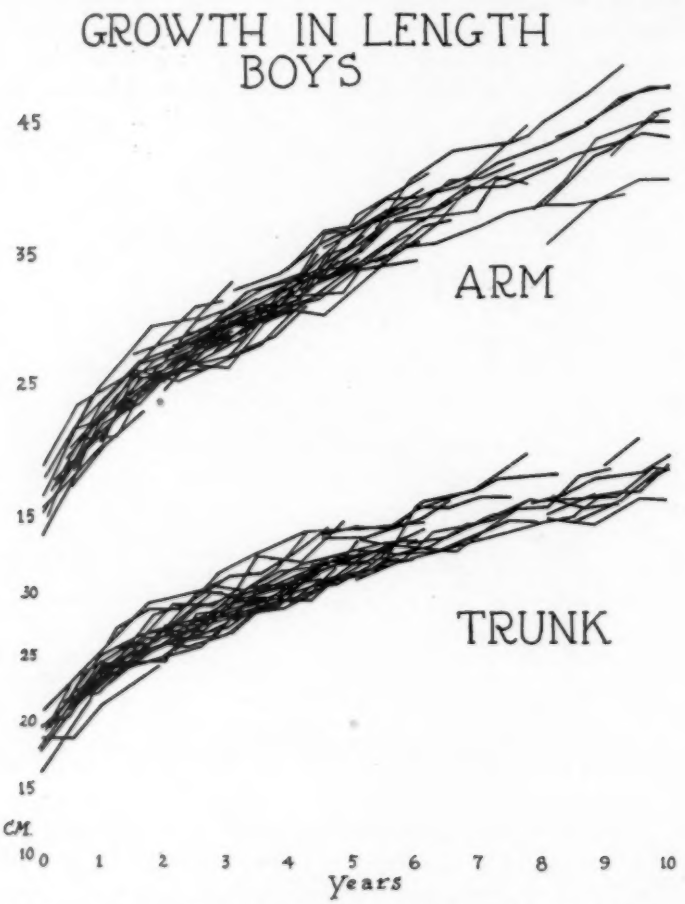


Fig. 4.—Growth curves of arms and trunks of the boys in the Child Research Council series. Compare with Fig. 5.

ence gives to the wise clinician concerning the diagnosis or prognosis of a given case. Thus the anthropometric study serves as a constant check on the impressions of the clinician.

Full-length photographs (Figs. 6-11) taken at yearly intervals make a most satisfactory permanent record which is of value to all of us, but particularly to the pediatrician and the orthopedist in their periodic

examinations. As has been shown by other workers, notably Gesell and his group, motion pictures also make an invaluable record of progress and behavior. We have just recently added this to our list of routine procedures.

The x-ray as well as the camera lends itself most beautifully to the study of growth and development. In Fig. 12 are shown the wrists of

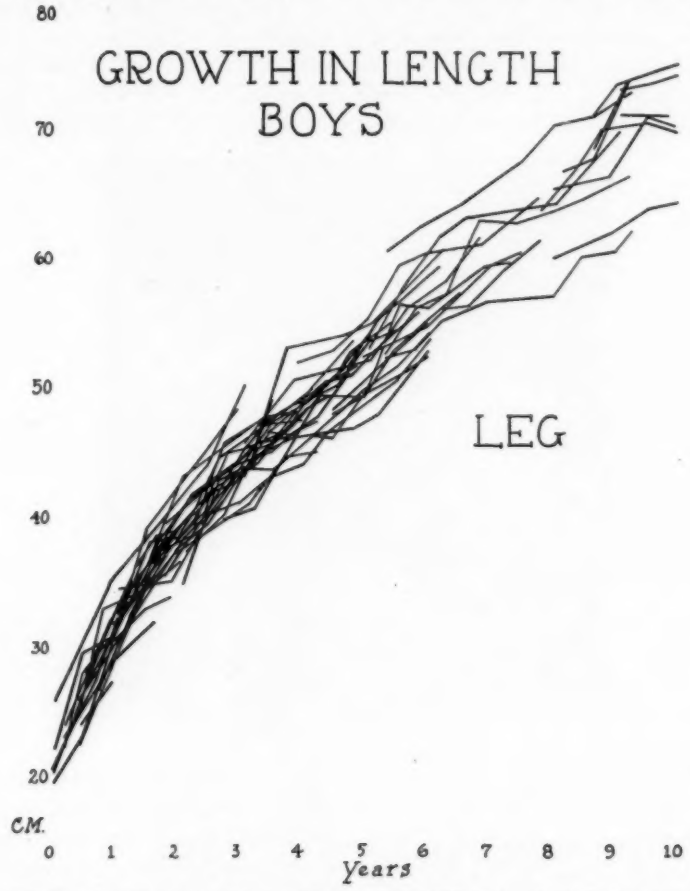


Fig. 5.—Growth curves of legs of boys in the Child Research Council series.

four healthy babies. By obtaining x-ray films of the long bones and the epiphyseal centers as they develop year by year, one builds up a valuable picture of the maturation of the bony skeleton. In spite of all the work already done, it would seem that the relation between bone age and actual chronologic age still needs some clarifying. I believe that this can be done only by the careful study of the developing bones in a group

of children who are also being followed from many other aspects, so that the relative importance of the different evidences of maturation may be evaluated properly. I have chosen this particular illustration of our x-ray films of bones because it shows the marked degree of variation from the very start of life. Thus of two healthy four-month-old babies one has three epiphyseal centers showing while the other has none.

A brief description of the dental study[3] may serve as a good example of the general method of approach in many of our investigations, as well as an illustration of one means for depicting the difference between individual children. Our interest in the significance of individual variation[4] during healthy growth and development has led us to devise vari-

Fig. 6.

ous means for the vigorous pursuit of this particular phase of the study. Direct clinical observations of the teeth and jaws in relation to the head and face are made, and the results are carefully recorded as the first step in the dental study. Next, front and profile photographs are taken to scale and are filed as part of the permanent record. In Figs. 13, 16, 19, and 22 is a series of four such profile photographs taken at yearly intervals on two healthy boys of approximately the same size and age. The next permanent objective check on our clinical observations consists in the making of accurate plaster casts of teeth and jaws. In Figs. 14, 17, 20, and 23 are shown the casts made on the same two boys shown in the photographs. As a third check we have x-ray films of the teeth and head. The profile views on these same two boys are shown in Figs. 15, 18, 21, and 24. Thus we have for each child, first, our recorded

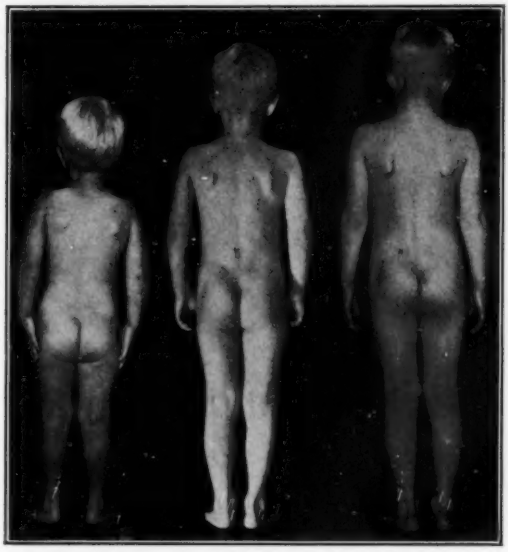


Fig. 7.

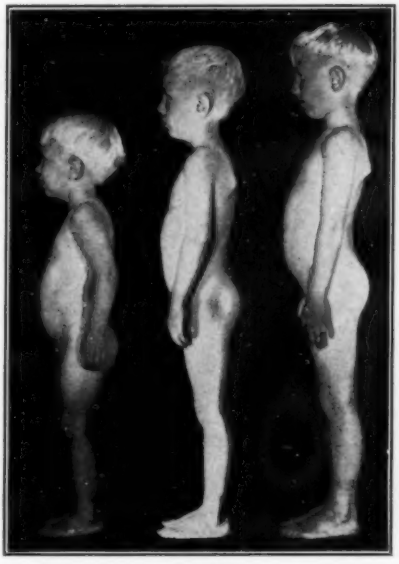


Fig. 8.

Figs. 6, 7, and 8.—Photographs of R. H. at 2 years 6 months, 4 years 2 months, and 5 years 3 months. (Taken routinely on all children in series.)

clinical observations, and then, as many permanent and objective records as we can devise for each study. Comparing these permanent records on different children from year to year gives opportunity for unhurried

Fig. 9.

Fig. 10.

study of these individual differences which you have seen portrayed and often suggests new means for the investigation of their significance.

I shall use the dental study to illustrate one more point of considerable importance. In Fig. 25 you will see 4 plaster casts. These are all from

Fig. 11.

Figs. 9, 10, and 11.—Photographs of C. W. at 2 years, 3 years 6 months, and 4 years 6 months. Compare with Figs. 6-8.

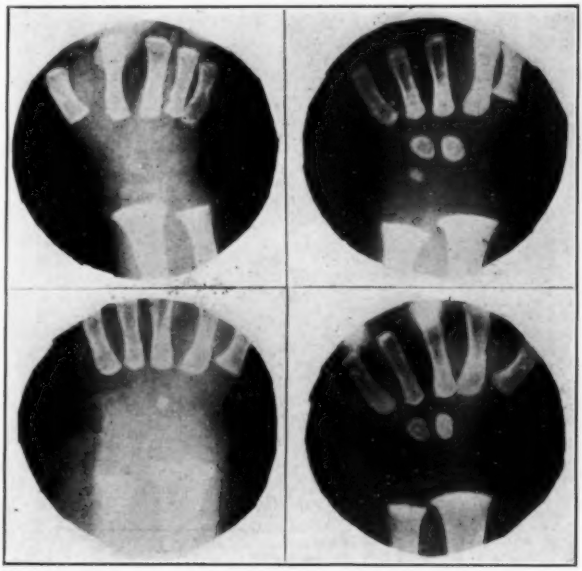
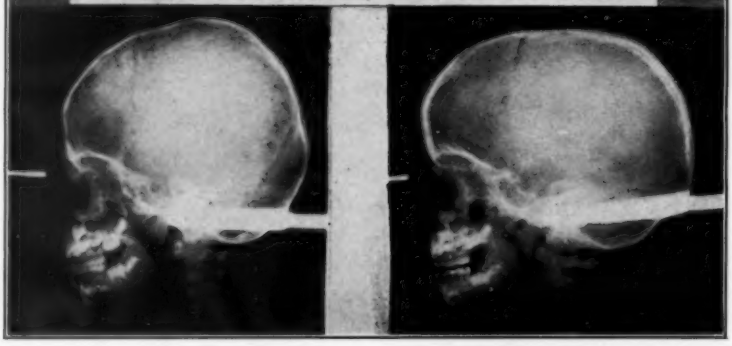


Fig. 12.—Comparison in development of epiphyseal centers of wrists in four healthy babies. Upper left and right are from two different babies of exactly 4 months while lower pair are from two different babies at 6 months.

Fig. 13.

Fig. 14.

Fig. 15.



Figs. 13, 14, and 15.—Profile photographs, casts of teeth and jaws and profile x-ray films on two healthy boys in the 5½-6½-year-age period. (From the dental study.)

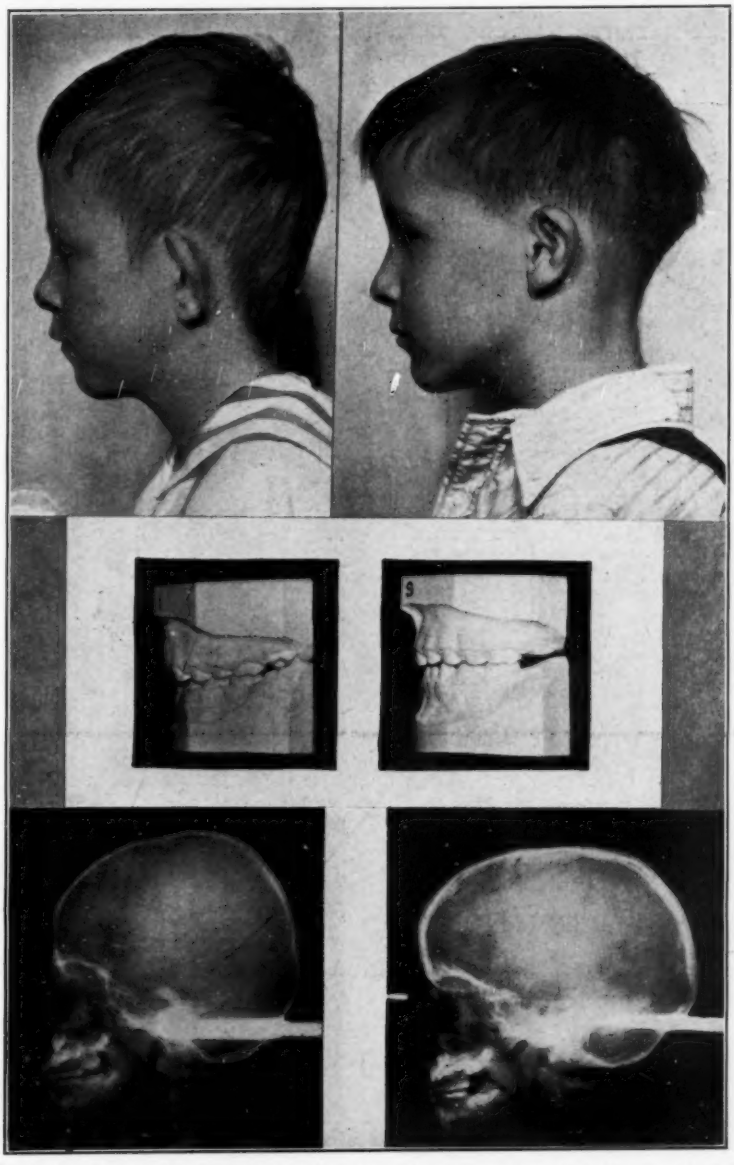


Fig. 16.

Fig. 17.

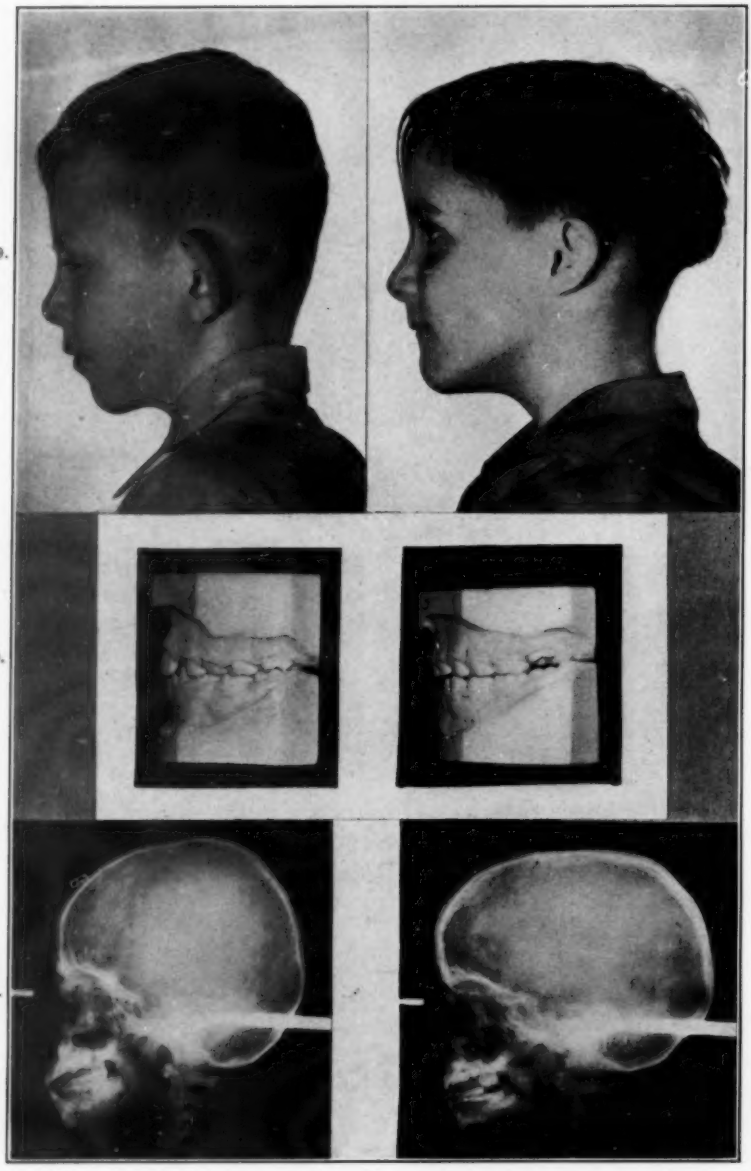
Fig. 18.

Figs. 16, 17, and 18.—Similar reproductions of the same two boys shown in Figs. 13-15. They are now both 7½ years old.

Fig. 19.

Fig. 20.

Fig. 21.



Figs. 19, 20, and 21.—The same boys shown in Figs. 13-18, now 8½ years old.

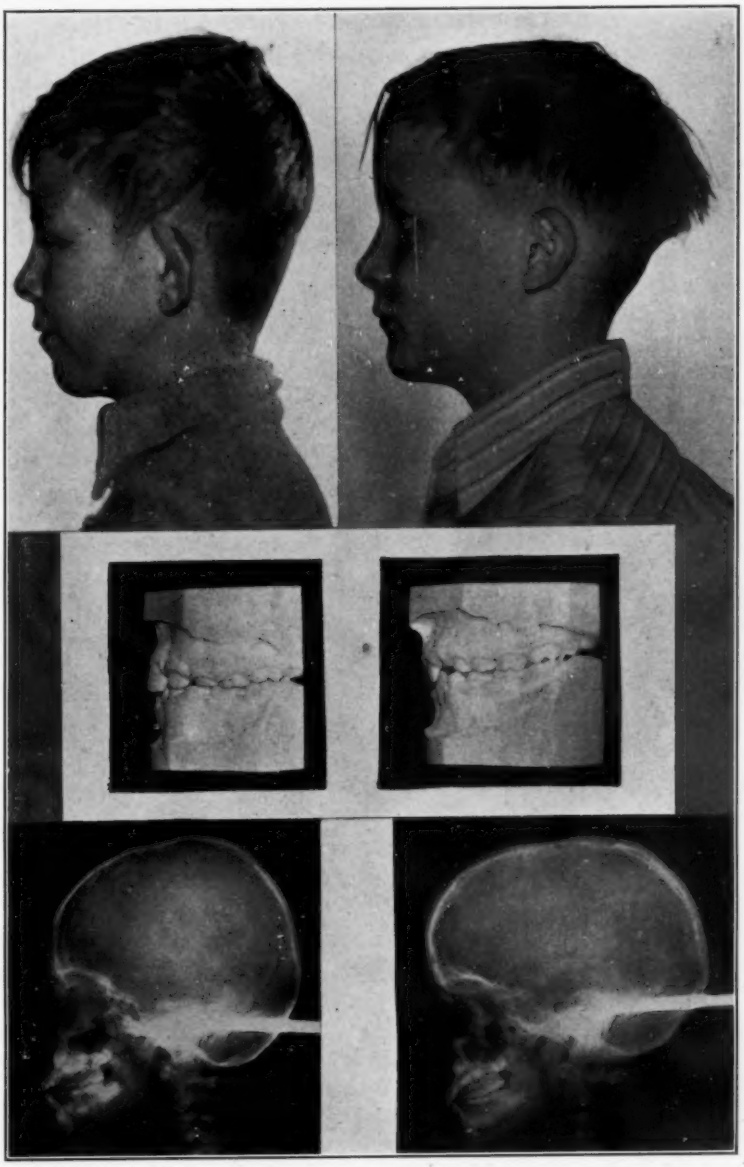


Fig. 22.

Fig. 23.

Fig. 24.

Figs. 22, 23, and 24.—The same boys shown in Figs. 13-21, now 9½ years old. (See text.)

the same baby at two days, one month, three months, and six months of age. At birth good orthodontic opinion suggested that this represented a deformity of the jaws which would need treatment. And yet in six months' time it had corrected itself in the course of healthy growth without treatment or interference of any kind. Surely it is tremendously important to know what apparent disorders need treatment and which ones can be expected to straighten out during healthy growth and development. Only by following for many years a group of individuals either in practice or in an institute such as ours can we gain such information.

We usually think of x-ray films in connection with the diagnosis of disease. This is particularly true of roentgenograms of the chest. For a few minutes I shall ask you to consider the value of such reproductions in the study of growth and development rather than of their usefulness in diagnosis—though it is true that not infrequently we are enabled to study the very start of some disease process simply because we are obtaining such routine x-ray films every three months on each child. In Figs. 26 to 39 are shown two series of such roentgenograms taken on two

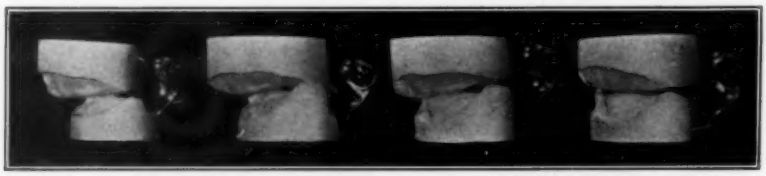


Fig. 25.—Casts of jaws on same baby at 2 days, 1 month, 3 months, and 6 months of age. Note disappearance of early malocclusion. No treatment.

healthy children. The first pictures were taken in the third week of life and the others follow at approximately four- to six-month intervals up to five years. That is, this series represents a selection of about half of the total number of chest films which we have on each of these two children. As we follow through from the third week up to the fifth year, I shall ask you to observe particularly the following points in comparing the development of these two healthy children: the size and shape of the heart, its growth in relation to the growth of the rib cage, the contour of the chest and the degree of inspiration as noted by the lift of clavicles and ribs and the descent of the diaphragm, the density of the shadows cast by the pulmonary vessels and the bronchi—that is, the so-called lung markings—particularly about the hila. Even a hasty survey of these films would give a good idea of the growth process with its rapid spurt in the first year followed by slower progress in the preschool years. It also suggests the differences between individuals in such characteristics as heart shape, breathing, or heaviness of the structures in the lungs and mediastinum—differences which are brought out with more startling contrast when one tries to find, in our whole series of children, two who

are just alike. I should like to mention a few of the problems which such a series suggests, and which have been occupying our attention over and above the direct study and comparison of the x-ray films.

For instance, the great variations observed in heart shapes and apparent sizes have led us to investigate the possible range of size and how to measure it most accurately. The desire to compare the heart with

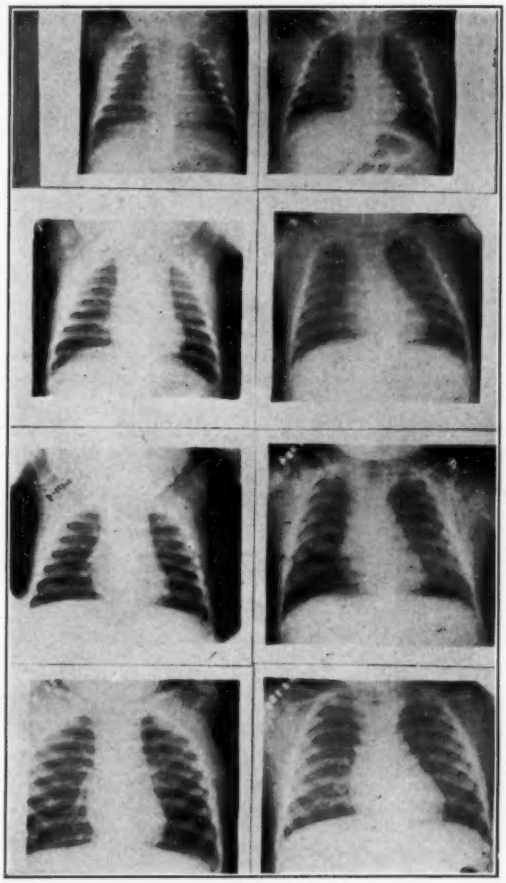


Fig. 26.

Fig. 27.

Fig. 28.

Fig. 29.

Figs. 26, 27, 28, and 29.—Chest roentgenograms on two healthy infants at 1 month, 3 months, 6 months, and 12 months. In these and the following ten pairs of x-ray films on these same children, compare the heart shapes, diaphragms, contour of rib cages, ribs, and lung markings.

the rest of the body during growth necessitated measuring the cardiac surface area as well as its diameters. The variations in contour and position within the chest stimulated us to attempt correlations with the electrocardiograms[5] taken at the same time and also with the physical examination and the reaction of the cardiovascular system to changes

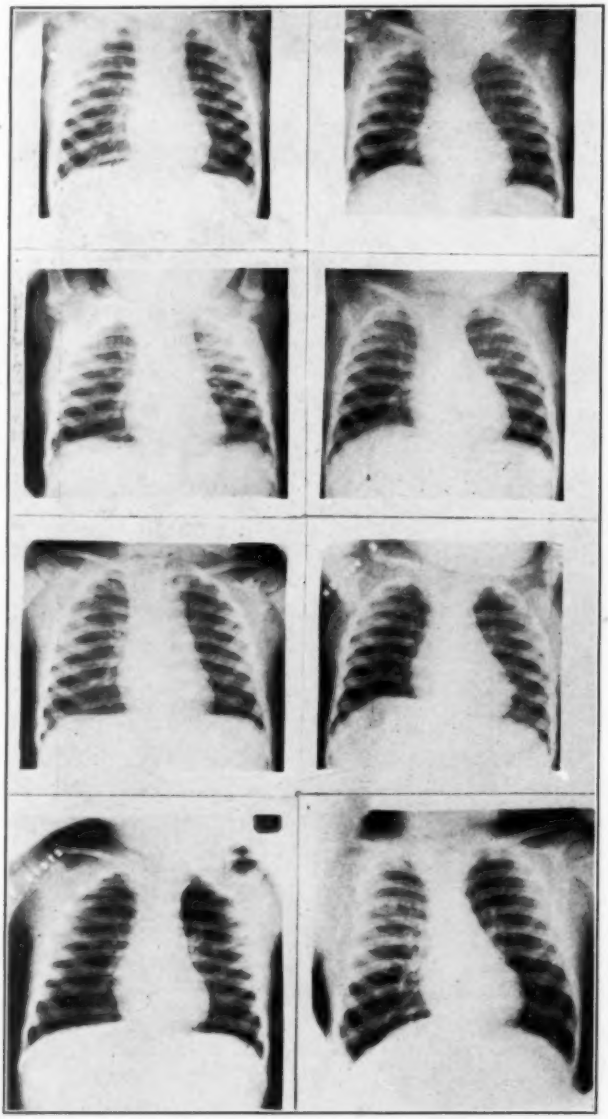
in posture, to exercise, and to fatigue. In such ways endless vistas open up for valuable and interesting studies on the heart and vascular system.

Fig. 30.

Fig. 31.

Fig. 32.

Fig. 33.



Figs. 30, 31, 32, and 33.—The chests of the same two children shown in Figs. 26-29. Growth from 1-2½ years.

Consider for a moment some of the problems concerning the lungs, observed in the same films—problems which fairly shout for some one to

solve them. How much of the increase in the heaviness of the hilar markings is dependent upon the growth process? Most children have colds, many have sinusitis or otitis, and a few have bronchitis either with their acute upper respiratory infections or complicating such diseases as measles or whooping cough. What part do these various disease processes play

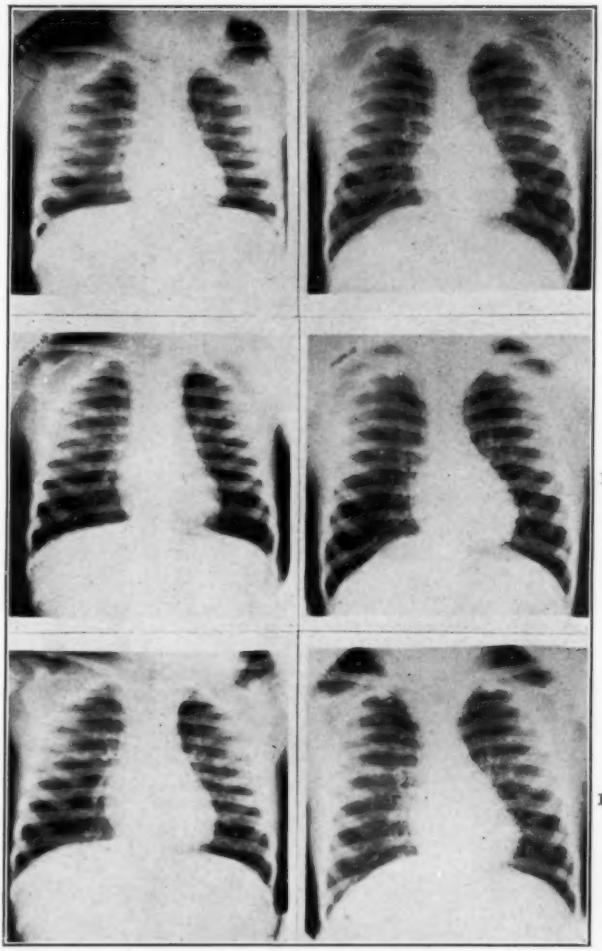


Fig. 34.

Fig. 35.

Fig. 36.

Figs. 34, 35, and 36.—The same two children from 3-4 years. (See notes under Figs. 26-29, and 30-33.)

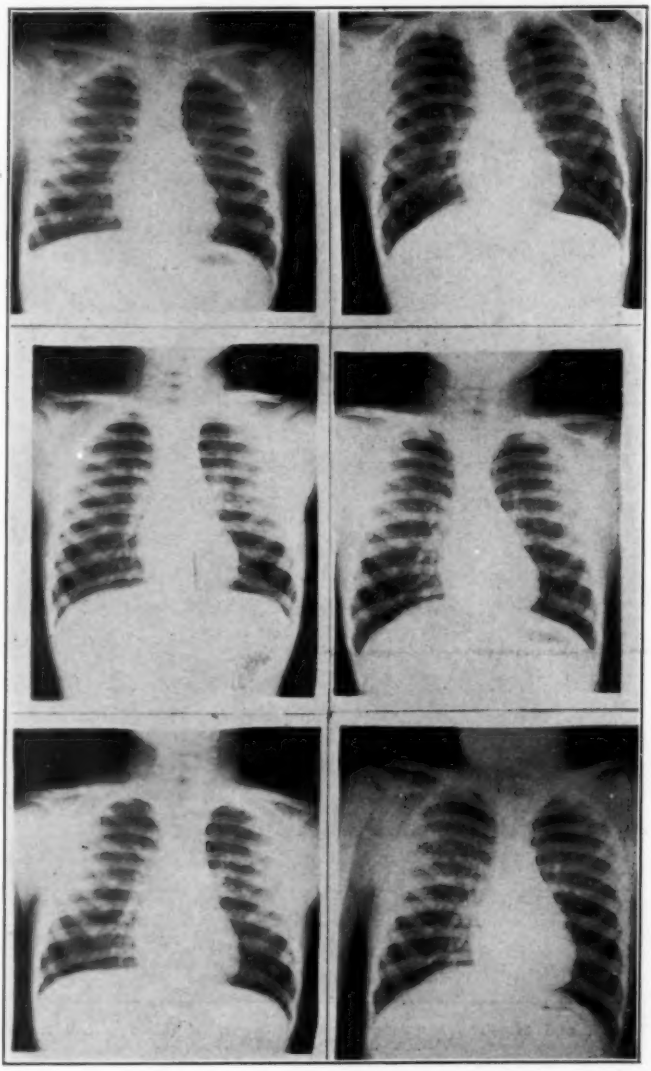
in producing heavier lung markings in one child than in another? X-ray films of the sinuses are taken always at the same time as those of the lungs. Is there such a thing as a chronic infection involving both sinuses and bronchial tree? Is there any evidence of allergy as a causative factor? We have adopted a combined clinical, roentgenologic, ana-

tomic, and pathologic attack upon these complex problems. Since a Child Research fellow has charge of all autopsies on infants and children in the University Hospital, we have access to a good deal of mate-

Fig. 37.

Fig. 38.

Fig. 39.



Figs. 37, 38, and 39.—The same two children shown in Figs. 26-36, ages 4, 4½, and 5 years. This whole series from 1 month to 5 years shows the growth of the chest and the structures within. These two children have been selected to depict the usual rather than an extreme degree of contrast.

rial for anatomic and pathologic investigation. X-ray films before death are often available, and x-ray films after death are taken routinely. In

addition to the study of the postmortem specimens in the gross at the time of the autopsy, we make large serial sections of the parts of the respiratory tract which we wish to study. In Fig. 40 may be seen such a section made through the region of the maxillary sinuses in a still-born baby of seven months' gestation. By such anatomic studies of the various portions of the respiratory tract running parallel to our clinical and roentgenologic studies, we hope to shed more light on some of these puzzles.

Lack of time prevents me from mentioning more than one additional type of investigation which has arisen from the study of the roentgenograms on our children. Although the roentgenogram is essentially a

Fig. 40.—Photomicrograph of frontal section through *a*, the maxillary sinus, at the level of *b*, the ostium, opening into *c*, the ethmoidal infundibulum, and through *d*, the semilunar hiatus into *e*, the middle meatus. *f*, An ethmoid cell. *g*, Infraorbital canal. (See text.)

portrayer of structure, repeated x-ray films often suggest interesting physiologic processes. In this way we have become interested in respiration, particularly in babies. Realizing the importance of satisfactory inspiration in the taking of chest films, we spent some time on the problem of an adequate measure of the degree of inspiration[6] on the film itself. During this time we became absorbed in the variety of rhythms and in the marked differences in rate and apparent depth of breathing in babies and have given some time to this problem.[7] In the investigation of the many functional aspects suggested by our x-ray films, we have hardly more than scratched the surface.

Another physiologic problem to which we have given a good deal of study concerns the blood. Of the many aspects of this investigation I shall refer to only one which has very direct clinical significance—the building up of normal standards for red cells and hemoglobin.[8] In Figs. 41 and 42 the range in the numbers of cells and in the grams of

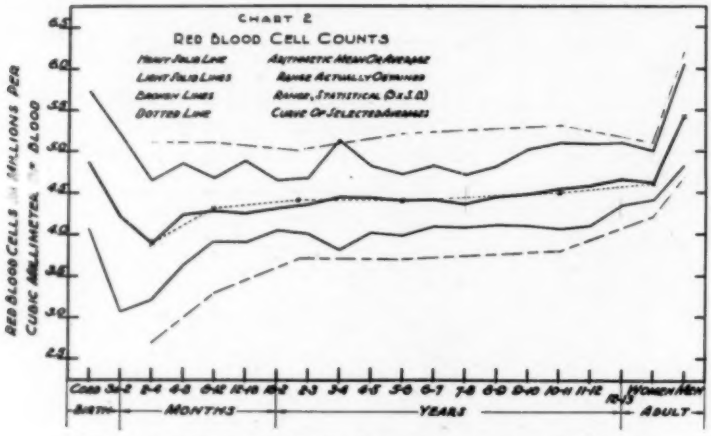


Fig. 41.—Range of red blood cell counts in average children.[8b]

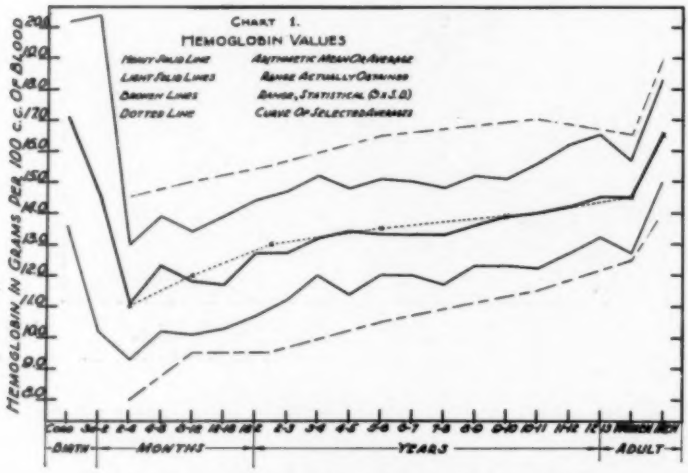


Fig. 42.—Range of hemoglobin values in average children.[8b]

hemoglobin for a group of healthy children from birth to twelve years is shown. The most striking thing about these charts is the width of the range within which variation occurs in apparently healthy individuals. These figures are from a cross-sectional type of study in which only one to four determinations were done on each of a large group of children. We are engaged now in following the counts on our regular

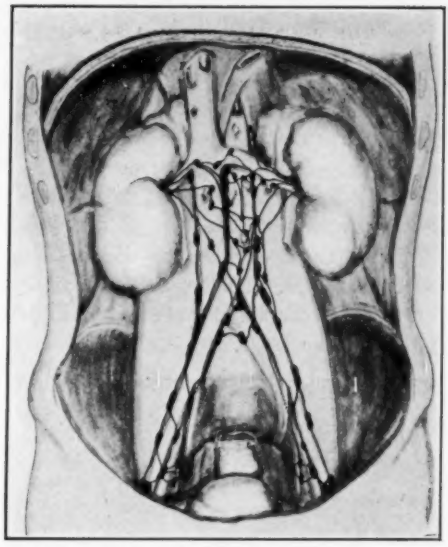


Fig. 43.—Postabdominal lymph channels, showing preaortic cross connections and connections with kidneys.

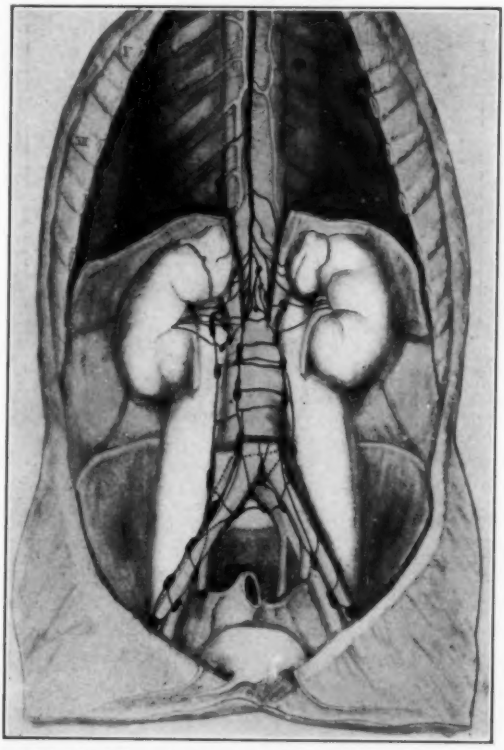


Fig. 44.—Postabdominal lymph channels, showing postaortic cross connections, kidney connections, and origin of thoracic duct. (Figs. 43 and 44 from camera lucida drawings, unpublished data.)

study series from birth to adolescence, the individual curves being plotted against these tentative standards. Red cell volume and diameters, reticulocytes, and leucocytes are also being followed.

All of the illustrations which I have shown so far have been directly related to our observations on the children whom we are following. I should like to give just a brief idea of a type of investigation which is most worth while, even though it has no direct connection with our observations on these children. There are so many gaps in our knowledge of fundamental structure and function in the growing human organism that one might make valuable contributions in a number of dif-

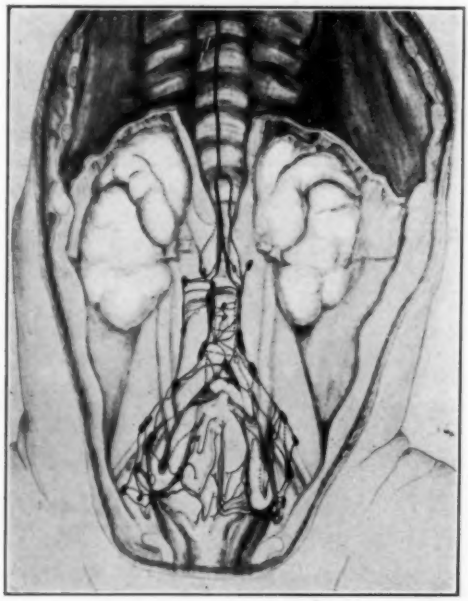


Fig. 45.—Courses taken by injection into anterior bladder wall showing regional nodes and their connections with main posterior lymph channels and thoracic duct.

ferent fields. We happen to have become interested in the lymphatics of the urinary tract, about which there was very little accurate information available. Injections and careful dissections of over 100 infant cadavers have already yielded much useful information.[9] In Figs. 43 to 46 are reproduced drawings made from four such specimens. Such an accurate delineation of the structure and distribution of the lymph channels and nodes as well as the parts drained by them is necessary before we can be in a position to work out more satisfactorily their function both during health and in the presence of infections. On the same postmortem material we have been carrying out studies of the pituitary, the spine, the lungs, and the nasal accessory sinuses.

As an example of investigations which demand both a very close following of our group of children and long hours of laboratory study, I should like to mention the basal metabolism determinations. Here we must have a painstaking study of the physical growth process and at the same time an intelligent understanding of the child's psychologic make-up and his behavior if we are to succeed in making the investigation worth while. Both the child and the scientific apparatus must be handled with skill. The reward for exercising such care is to be found in the interesting results,[10] which offer many fascinating possibilities in

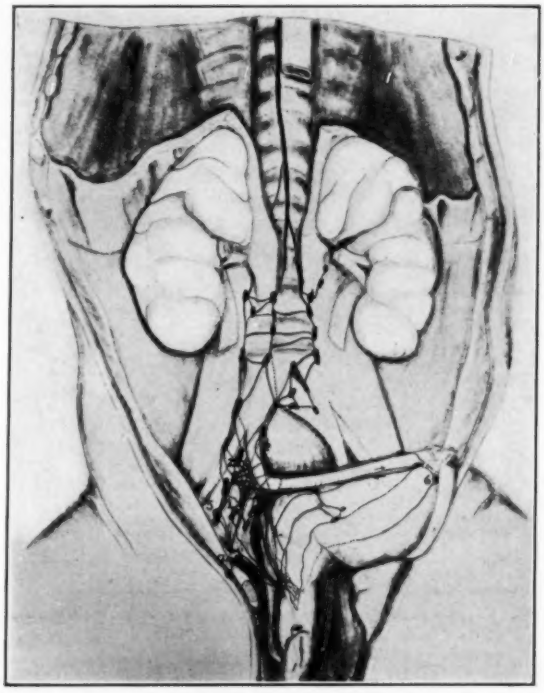


Fig. 46.—Courses taken by an injection of lymph channels leaving the posterior urethra in a male infant. (Figs. 45 and 46 from published data.[9b, c])

the nature of correlations with other parts of our whole study of these children. In Fig. 47 the results of 860 basal metabolism determinations have been scattered out according to calories per hour per kilogram charted against age in years. In addition, I have connected the dots representing successive determinations on five different children in order to show that while the whole zone of variation for the group is very wide yet the zone covered by any one individual over a time period is much smaller. In other words, we have here an illustration of the fact that there is a great deal of variation between individuals during healthy

growth but that any one individual has his own peculiar characteristics which tend to make him stay within one portion of the whole wide zone even though he shows a considerable degree of fluctuation from time to time. It is this picture of the individual's characteristics charted against the background of the total amount of variation in many children during healthy growth which we are trying to construct not simply for the basal metabolism but for all the structures and functions of growing children. We feel sure that such basic knowledge will represent a valuable contribution to the pediatrician in his efforts to guide the growth and development of the individual child along healthy channels which will represent optimum development for that child. We believe, too, that such knowledge is urgently needed in routine clinical practice. The early recognition of disease in the individual child would be greatly

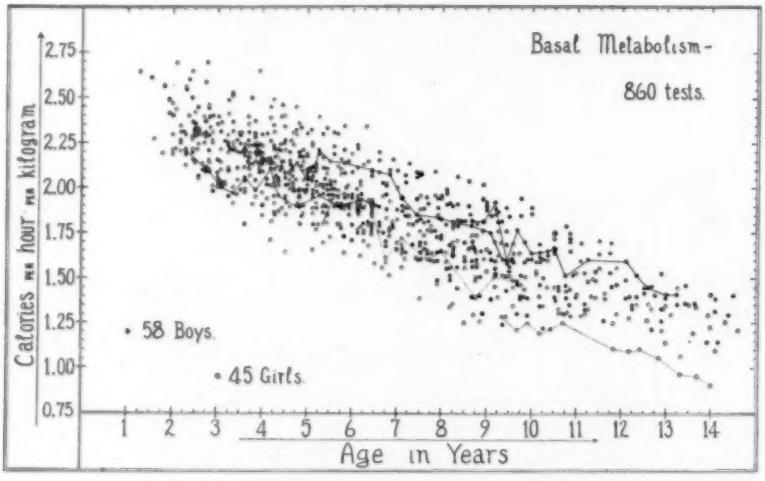


Fig. 47.—Scatter chart of repeated basal metabolism determinations on Child Research Council children over a period of five years. (See text.)

facilitated by such an understanding, as would also the adequate handling of one's patients during and after almost any one of the various diseases of childhood. Those of us who are engaged in such studies of children feel justified, therefore, in urging practicing pediatricians to give some thought to the work of the various child study institutes not merely for the sake of becoming familiar with the published data, but also in order to make their own observations on the children in their practice more complete and valuable to themselves and to others.

SUMMARY

A description has been given of the longitudinal study of average healthy children of Denver being conducted by the Child Research Council.

The general method of investigation has been represented as consisting of, first, a well-rounded group of clinical observations designed to give a picture of the whole child from many aspects; second, the obtaining of as many permanent and more objective measures and pictures of the growth changes as it may be feasible to carry out on the same child; and third, the repetition of these observations at regular intervals on each of 100 children from birth through adolescence.

The type and character of useful information which is being accumulated has been suggested by means of illustrations and charts.

In presenting the concept of "normal standards" as wide zones rather than average lines, I have stressed repeatedly the need for appreciating the significance of individual variation among healthy children.

This paper would not be complete without an acknowledgment to the various members of the Child Research Council staff, whose work forms so large a share of my presentation. It is a pleasure to express my appreciation for their enthusiasm, their skepticism, and the careful controlling of their investigations.

REFERENCES

1. Grandprey, M. B.: Range of Variability in Weight and Height of Children Under Six Years of Age, Child Development **4**: 26, 1933.
2. Woodbury, R. M.: Statures and Weights of Children Under Six Years of Age, 1921 Children's Bureau, U. S. Department of Labor, Washington, D. C., Bureau Pub. No. 87.
3. Waldo, Charles M.: Orthodontic Research as a Component Part of a Balanced Longitudinal Study of 100 Children, Internat. J. Orthodontia & Oral Surg. **22**: 659, 1936.
4. Washburn, Alfred H.: The Significance of Individual Variation, J. PEDIAT. **8**: 31, 1936.
5. Burnett, Clough Turrill, and Taylor, Evelyn Laura: Electrocardiograms on 167 Average Healthy Infants and Children, Am. Heart J. **11**: 185, 1936.
6. Allen, Kenneth D. A., and Waltz, Harold D., with the Technical Assistance of Dorothy D. Hanner: A Simple Method for Determining the Degree of Inspiration From the Chest Film, Radiology **24**: 225, 1935.
7. a. Deming, Jean, and Washburn, Alfred H.: Respiration in Infancy: I. A Method of Studying Rates, Volume and Character of Respiration With Preliminary Report of Results, Am. J. Dis. Child. **49**: 108, 1935.
   b. Deming, Jean, and Hanner, James P.: Respiration in Infancy: II. A Study of Rate, Volume and Character of Respiration in Healthy Infants During the Neonatal Period, Am. J. Dis. Child. **51**: 823, 1936.
8. a. Mugrage, Edward R., and Andresen, Marjory I.: Values for Red Blood Cells of Average Infants and Children, Am. J. Dis. Child. **51**: 775, 1936.
   b. Idem: Normal Standards for Red Blood Cell Values in Colorado, Colorado Med. (In press.)
9. a. Parker, Alice E.: Studies on the Main Posterior Lymph Channels of the Abdomen and Their Connections With the Lymphatics of the Genitourinary System, Am. J. Anat. **56**: 409, 1935.
   b. Idem: The Lymph Collectors From the Urinary Bladder and Their Connections With the Main Posterior Lymph Channels of the Abdomen, Anat. Rec. **65**: 443, 1936.
   c. Idem: The Lymph Vessels From the Posterior Urethra, Their Regional Lymph Nodes and Relationships to the Main Posterior Abdominal Lymph Channels, J. Urol. **36**: 538, 1936.
10. Lewis, Robert C., Kinsman, Gladys M., and Iliff, Alberta: The Basal Metabolism of Normal Boys and Girls From Two to Twelve Years Old, Inclusive, Am. J. Dis. Child. **53**: 348, 1937.

ELEVATED TEMPERATURES IN CHILDHOOD DUE TO EXERCISE

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THE object of this brief article is to prove that a very demonstrable rise in temperature will occur in normal children after exercise. Many children are the victims of 4 P.M. and other daily temperature readings because of some suspected chronic infection. These children are put to bed and at times are operated upon for the removal of suspected foci of infection, and have sown in them the seeds of chronic invalidism. Very often these temperatures would definitely fall within normal limits if the physicians had taken exercise into consideration as a cause of these readings.

METHOD

The study is based upon a series of 2,500 temperature readings from 30 children varying in age from three to fourteen years old, taken at the Emma Pendleton Bradley Home in East Providence, R. I. The children selected were those with no physical defects other than the common dental or visual abnormalities. Each child had been admitted because of behavior problems due to maladjustment at home or at school. The following routine was used: The temperatures recorded in Fahrenheit degrees were taken rectally at 6 A.M. before arising, at 11 A.M. before lunch, at 4 P.M. before supper, and at 8 P.M. before retiring. In addition to recording the temperature, a note was made of the type of exercise and the activity of the child for an hour or so before his temperature was taken (Table I). Two periods of twelve days each were chosen in February, 1936, and in April, 1936, thus giving both winter and spring activities.

TABLE I

TYPE OF DAILY NOTES KEPT DURING PERIODS OF OBSERVATION

FEB. 6	6 A.M.	11 A.M.	4 P.M.	8 P.M.
C. K.	98.3	99.2 school, quiet	100.8 sleighing, very active	99.4 on ward, quiet
M. M.	97.6	99.0 school, quiet	99.8 sleighing, not active	99.8 on ward, running about
R. S.	98.4	100.1 snowballing, active	101.4 sleighing, very active	99.2 on ward reading

No specific exercises were given and the children followed out the usual routine of the home. This included school in the morning or afternoon, inside sports, and various outdoor activities. The exercise

This paper was prepared from material obtained at the Emma Pendleton Bradley Home, by the kindness of Dr. A. H. Ruggles and Dr. C. Bradley.

was, for purposes of analysis, divided into two types: mild, which consisted of school, cinema, council, or walking about the wards, and severe, which consisted of sleighing, skating, basket ball, and baseball. From these figures, Charts 1 and 2 were compiled showing the various levels reached after both mild and severe exercise. In addition, a record was taken of the highest temperature reached by each individual at any time, and from these, Chart 3 was compiled.

Many factors besides exercise could produce an elevated temperature; the most important of which are the metabolic stimulation of food and the results of infection. To minimize the first, we took the readings just

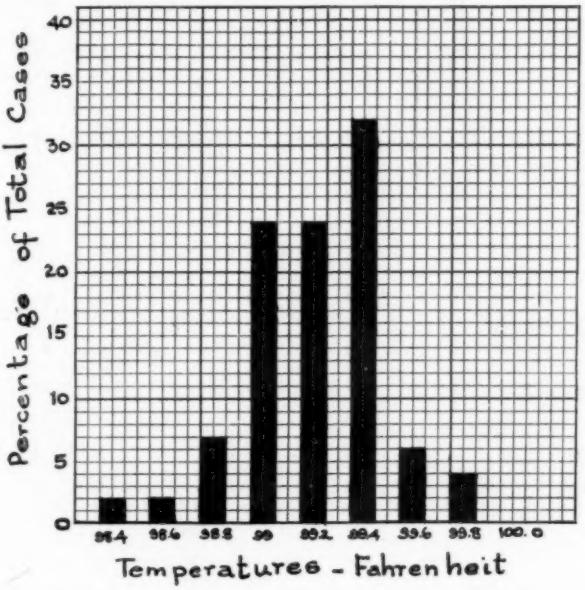

Chart 1.—Effect of mild exercise on the temperature of the child.
Ordinates are percentage of the total cases. Abscissae are rectal temperatures, Fahrenheit, after mild exercise.
Each temperature includes the one above, i.e., 99.0 includes 99.0 and 99.1° F.

before food was taken and to minimize the latter, daily ward rounds were done and every second day the children were specially examined for any upper respiratory infection. All the children with any evidence of an infection were rejected. In addition to these precautions, complete physical examinations and urinalyses were done within a month or so of the periods of observation.

OBSERVATIONS

There is definite proof that exercise will raise the body temperature. The average resting temperature for all the children was 98.2° F. and

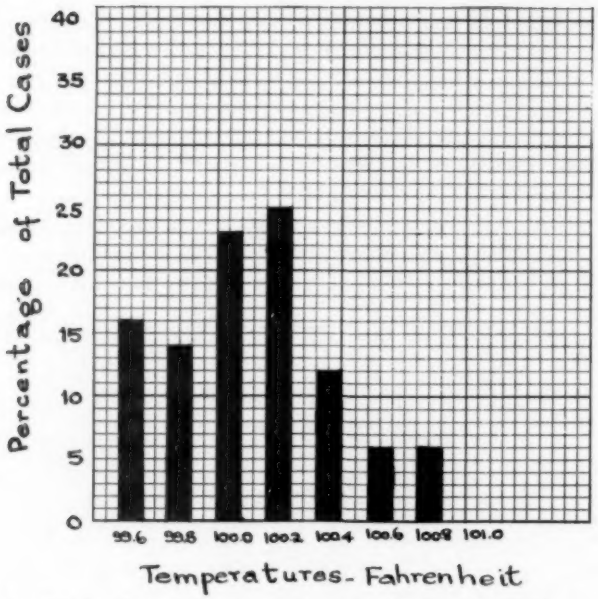

Chart 2.—Effect of severe exercise on the temperature of the child.

Ordinates are percentage of total cases. Abscissae are rectal temperatures, Fahrenheit, after severe exercise.

Each temperature includes the one above, i.e., 99.8 includes 99.8 and 99.9° F.

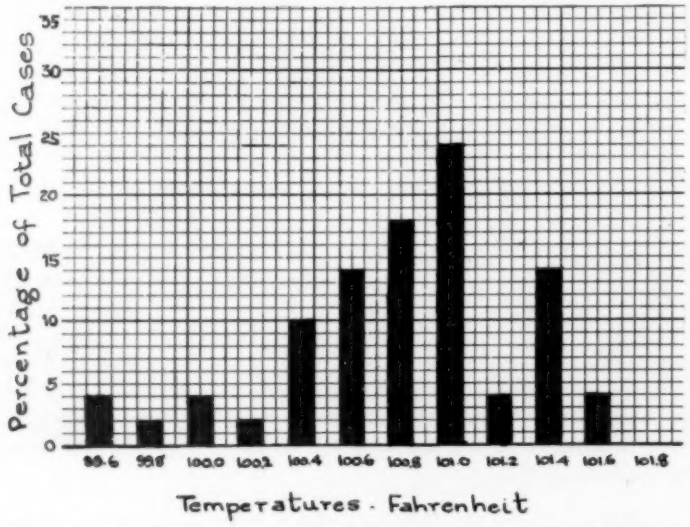

Chart 3.—Highest temperature readings obtained for each individual after exercise.

Ordinates are percentage of total cases. Abscissae are rectal temperatures, Fahrenheit, and are the highest readings obtained for that individual.

Each temperature includes the one above, i.e., 100.4 includes 100.4 and 100.5° F.

varied from 97.3° to 99.8° F. When we consider the results after mild exercise (Chart 1), we find that the average level was 99.2° F. and that 90 per cent of the children were above 99.0° F. Similarly, when we examine the results of severe exercise (Chart 2), we find the average reading was 100.2° F. and that 70 per cent of the children were over 100° F. If we look at the highest values reached by the children at one time or another (Chart 3) we have an average value of 101° F. with 80 per cent over 100.6° F. The highest readings obtained were 101.6° F. after a game of baseball.

There are a number of other facts which seem definitely established. Every child showed some elevation in temperature after exercise. The height reached in most cases depended upon the activity of the child, but in a few cases this correlation was not true, and one must suspect some constitutional factor probably involving the heat regulatory centers. For example, M. B. would persistently show temperatures of 101.4° F. or so after a strenuous game, yet P. R., who played just as energetically would show levels of only 99.8° F. or so. The response of the individual to exercise is fairly constant, although occasionally there were marked differences in the readings obtained after similar activities on different days. There is apparently no relation to sex or age and some of the highest values were obtained from children twelve years or older.

In order to see how long the temperature would remain up after exercise we checked some of the 4 P.M. readings every thirty minutes until the children were in bed. The time taken to fall to 99.2° F., the level of mild exercise, varied with the routine chosen. If the children were allowed to carry on the ward routine only a few reached that level within sixty minutes, and most temperatures were up until bedtime or later. If the children were put to bed at 4 P.M., most temperatures reached that level within sixty minutes.

CONCLUSIONS

It is evident that exercise will elevate the temperature of the normal child, regardless of age or sex and depending chiefly upon the amount of exercise taken.

Severe exercise will usually produce a rectal temperature of 100.2° F. or over on repeated occasions and at times it may reach 101° F. The highest values recorded were 101.6° F. after a game of baseball.

When taking daily temperatures upon ambulant children, one should always check the amount of activity expended prior to the recording, as that alone may be responsible for figures as high as 101° F. or over.

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CARE OF THE SKIN OF THE NEWBORN INFANT

A Six-Year Study of 3,500 Newborn Infants

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THE skin of the newborn infant frequently shows irritative and other lesions that make it a problem to most hospitals. While there are many classifications of these early lesions, all of the important disorders may be placed in two groups:

First are the irritations, which include erythema neonatorum, erythema toxica, and the intertrigos. Erythema neonatorum is so universal that it may be dismissed as of normal occurrence. Erythema toxicum includes the erythematous macules and papules. The simple macular form consists of slightly raised red macules surrounded by a ring of erythema. These are often so slightly elevated that only a sensation of infiltration can be obtained when the skin is stroked with the finger. The macules are closely set and frequently coalesce in large patches, which spread over the body. These macules have no predilection for any part of the body. Frequently associated with the macules are papules of a whitish color. They vary in size from that of a large pinhead to that of a pea, and are situated centrally in an erythematous area, thus resembling a wheal. They have a tendency to appear more on the posterior surface of the body, particularly the buttocks. This condition rarely lasts longer than three days and leaves no residuum. It is particularly important because from its appearance it may become a source of worry to the mother and because the skin, apparently left in a state of irritation, may prove a fertile field for the development of pyodermic lesions.

The intertrigos are erythematous patches occurring in skin folds, as the creases of the neck, axillae, and genitogluteal region. They are presumed to be due to a certain predisposition on the part of the infant plus irritation with vernix, feces, or urine. With these may be included irritation on the face from rubbing with the hands. This group is important because exfoliation may occur with secondary infection by the pyodermic organisms causing vesicles and pustules.

The second group may be termed the "pyodermias." While in a strict sense this term is correct, from its frequent use as signifying an exogenous infection it would seem that the simple term "pustules" would be better. The pustules may be divided into two groups: an

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endogenous type, originating from some process in the body, such as syphilis, and an exogenous group. For clinical purposes the endogenous group is now so rare that it may be dismissed, and only the exogenous group will be discussed.

It is customary to group all vesicles and pustules of an infectious nature in the newborn under the loose term of "pemphigus neonatorum," or "impetigo." This has led to considerable confusion as many physicians associate all pemphigus and impetigo with the highly contagious and fatal exfoliative type. The word "pemphigus" in a nursery sends shivers down the backs of all the personnel, and an epidemic is presumed to be imminent. For this reason, the terms "pemphigus" and "impetigo" are not used in many records, and such terms as "dermatitis," "benign pustules," and the like conceal the true lesion, since it is considered a blot on the hospital record to have pemphigus develop in an infant.

I am of the opinion that it would be better to discard these terms and classify the pyodermias into "pustules," and "pustules with exfoliation." Pustules, or vesicles, in the newborn infant usually appear after the third day but may appear any time from birth throughout the neonatal period. They vary in size from that of a pinhead to that of a pea, and may appear separately or in groups. They may appear anywhere on the body except on the palms and soles. The primary lesion, a red patch, is followed by vesicle and pustule formation. The vesicles or pustules may dry up or, if ruptured, may leave shreds of moist epidermis. The fluid is rather opalescent. Pyogenic organisms have been cultured from the lesions by some investigators, but I have never been able to do so. The outcome of this type of lesion under treatment is always favorable, but, as a general rule, it should be regarded as infectious.

Pustules with exfoliation are sometimes called "pemphigus neonatorum malignus." Here the pustules and vesicles increase rapidly in size and number and extend over the surface of the body. The characteristic lesion is the exfoliation of the skin which is free of vesicles. The extension of this process leads to denuding large areas of skin of epidermis. In severe cases this condition resembles exfoliative dermatitis, known as Ritter's disease. Sometimes the lesions even burrow into the soft tissues, causing pyodermic abscesses. All exfoliative or pyodermic abscess forms of pustules are very serious, highly contagious, and frequently fatal.

It is difficult to ascertain the frequency of skin irritations and infections in the newborn infant. A general survey of the literature reveals much conflicting opinion as to the frequency of acquired skin lesions. In Table I are tabulated the reports of the last five years, which give the percentage of skin lesions from 0 to 6.

The discrepancy seems to result from a failure to define exactly what is meant by "skin lesions," and this must be borne in mind before any attempt at the valuation of these statistics is made. DeLee, of Chicago, reports five years without a lesion's developing in an infant on his services, and Chadwell reports the same for three years. Both refer to "impetigo." If this means "pustules with exfoliation," the experience is not unusual; if it means any pustular lesion, the experience is unusual. Doty, in Michigan, gives the highest percentage. His first series contained 6.1 per cent of "impetigo," and 3 per cent of "pustules." Following his treatment, this fell to 0.9 per cent "impetigo," and 1.2 per cent "pustules." Doty is a dermatologist, and his observations based on personal experience are probably the most accurate in the series.

Carter and Osborn, in England, give 3.8 per cent but include all acquired skin lesions under the term "neonatal dermatitis." From this classification their results were excellent. Adams studied the problem from the standpoint of nursing technique. Her observations are taken from the records of three different hospitals. The lesions included are stated to be "impetigo." A hospital using the central system of infant care reported 2.5 per cent; a general hospital, using the central system by improving its nursing technique, reduced the impetigo incidence to 1.2 per cent; and the third hospital, using the unit system, had 0.6 per

TABLE I

FREQUENCY OF SKIN LESIONS IN NEWBORN INFANTS

AUTHOR	LOCALE	INFANTS	YEAR	%	REMARKS
Chadwell	Boston	5,000	1925-8	0	"Impetigo." Ammoniated mercury used.
DeLee	Chicago	33,000	1924-9	0	"Impetigo."
Doty	Michigan	884	1929	6.1	Impetigo.
				3.0	Pustules.
		2,109	1930-32	0.9	Impetigo } After use of ammoniated mercury.
				1.2	Pustules }
Carter and Osborn	Liverpool	1,122	1934	3.8	Called "neonatal dermatitis."
Adams	Seattle	977	1933	1.2	Impetigo. General Hosp.
	Seattle	3,687	1932-6	2.52	Impetigo. Central control.
	Newark	2,987	1932-6	0.6	Impetigo. Unit control.
Guy and Jacob	Pittsburgh	2,344	1929	1.4	Impetigo.
		2,363	1930	0.1	Impetigo } Ammoniated mercury used.
		2,884	1931	0.05	Impetigo }
		2,522	1932	0.05	Impetigo }
Potter and Abel	Newark	1,310	1935	2.0	Ammoniated mercury and commercial oil used.
				0.9	
Beane	California	458	1935	1.5	"Impetigo." Copper oleate used.
		362	1935	0	No treatment at all.

cent "impetigo." Guy and Jacob, in Pittsburgh, in four years reduced the frequency of impetigo from 1.4 per cent to 0.05 per cent by the use of ammoniated mercury. Potter and Abel, in Newark, re-

duced their percentage of skin lesions stated as such from 2 per cent to 0.009 per cent. However, as they had twelve cases in 1,310 infants, this final percentage should be 0.9. Beane, in California, reduced the incidence of cases of impetigo from 1.5 per cent to zero. This appears to be a well-controlled observation which will be discussed more fully.

It is plain from the above discussion of these reports that the frequency of skin lesions in the newborn infant is still unknown. For this reason in 1930 the following study was begun. The skins of the newborn infants were examined at birth and each day thereafter by a pediatrician. All lesions of any type were noted. The lesions were classified into three groups:

1. Irritations. This includes all erythematous macules and papules, as erythema toxicum, and all forms of intertrigo.

2. Pustules. This includes all vesicles and pustules, as the so-called benign pustulosis, impetigo, and pemphigus neonatorum.

3. Pustules with exfoliation. This includes dermatitis exfoliativa. There was no case of this in this series covering six years.

METHOD OF CARE

1930. The study was begun in January. The nursery care at this time consisted of annointing each newborn infant at birth with 2 per cent ammoniated mercury. This was followed by a daily water bath, with castile soap. The nursing care was the usual central type.

1931. At the beginning of this year the same routine treatment was used, but the nursing technique was changed as follows: Much larger quarters were assigned for nursery space. This allowed three nurseries. One was used for normal infants, one for those with minor irritations of the skin, and one for isolation of infants with more severe lesions. The following plan was adopted: If any skin irritation was found the baby was removed from the nursery for normal infants to the second nursery, where he was kept until the skin was clear. If a pustule was found, the infant was removed to the isolation nursery on another floor, and the mother was removed from the maternity floor. The nursery for normal infants was closed, and all newborn babies were admitted to the second nursery. When all of the normal babies in the first nursery had been discharged, it was washed and cleaned before reopening. The hospital also installed a cooling system in all nurseries whereby the year-round temperature was 80°.

A graduate nurse, put in charge of the nursery, was the only nurse who touched the babies when they were naked. All nurses were masked and gowned. No person was allowed to touch a newborn infant until his hands were washed in soap, water, and alcohol. All nursery linen was washed in neutral solutions before sterilizing. Each nursery was operated as a separate unit.

1931-32. In August, with the same nursing technique, the routine care was changed to the extent that 2 per cent ammoniated mercury was used at birth, and olive oil was used daily thereafter. No water was used on the skin in any way.

1932-33. In August, 1932, ammoniated mercury was discontinued, and olive oil was used alone on the skin.

1933-34. From August, 1933, a commercial baby oil was used alone on the skin instead of olive oil.

1934-35. From August, 1934, a mixture of olive oil and mineral oil was used alone on the skin.

1935-36. Beginning in August, 1935, the skin was untouched for the first nine days. This means that nothing was done at birth except to

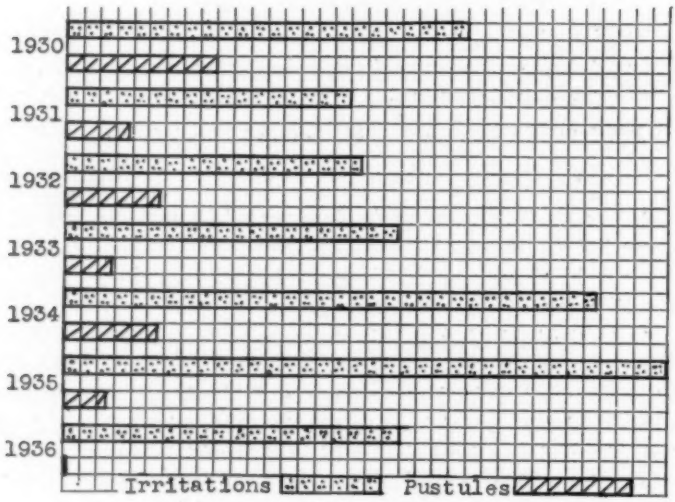

Chart 1.—Frequency of skin lesions in newborn infants.

wipe off the excess blood. The baby was then shirted and diapered, and nothing more was done for nine days except the usual changing. After this time a daily bath was given in olive oil and mineral oil.

RESULTS

The results are shown in Table II. In the first column the year and method of treatment are given; in the second column the season is shown. It was decided to divide the years into thirds, giving results from January 1 to April 30, May 1 to July 31, and August 1 to December 31. After 1931 each new schedule was begun in August which change explains the short period in 1931. The next columns give total infants cared for in these months, the number of irritations with the percentage, and the number of pustules with the percentage. The total for each

year is given. There is no column for pustules with exfoliation since no cases occurred in the six-year study. Chart 1 illustrates graphically the yearly number of pustules and irritations.

DISCUSSION

First, it will be noted that there was no seasonal incidence for either irritations or pustules. It has often been stated that skin eruptions in the newborn infant are worse in the summer months. This was not so in our series, even in the year before the nursery was cooled in summer. However, summer cooling may have had a favorable effect.

TABLE II

SIX-YEAR STUDY OF SKIN LESIONS IN NEWBORN INFANTS

YEAR	SEASON	INFANTS	IRRIT.	%	PUST.	%
1930-1931	Jan. to May	69	10	12.0	3	5.0
2 per cent ammoniated mercury at birth. Water thereafter.	May to Aug.	63	6	9.0	1	2.5
	Aug. to Jan.	144	17	12.1	9	5.0
	Total	276	33	12.0	13	4.5
1931	Jan. to May	130	11	8.5	3	2.3
Same. Nursery technique improved. Constant temperature.	May to Aug.	133	12	9.1	2	1.5
	Total	263	23	8.5	5	1.9
1931-1932	Aug. to Jan.	246	12	4.9	4	1.6
Ammoniated mercury at birth. Olive oil thereafter.	Jan. to May	166	22	13.2	6	3.6
	May to Aug.	212	18	8.5	6	2.8
	Total	624	52	8.8	16	2.7
1932-1933	Aug. to Jan.	235	22	9.4	3	1.2
No antiseptic at birth. Only olive oil used.	Jan. to May	182	27	14.8	5	2.8
	May to Aug.	168	6	3.5	2	1.2
	Total	585	55	9.2	10	1.4
1933-1934	Aug. to Jan.	196	19	9.7	8	4.0
No antiseptic at birth. Only commercial oil used.	Jan. to May	189	27	19.5	3	1.6
	May to Aug.	145	27	10.5	3	2.0
	Total	530	73	15.8	14	2.8
1934-1935	Aug. to Jan.	250	42	16.8	3	1.2
No antiseptic at birth. Olive oil and mineral oil.	Jan. to May	243	66	27.0	4	1.6
	May to Aug.	147	14	9.5	2	1.3
	Total	640	122	18.0	9	1.3
1935-1936	Aug. to Jan.	228	28	12.0	1	0.4
No antiseptic at birth. Skins untouched for nine days.	Jan. to May	149	13	9.0	0	0.0
	May to Aug.	232	20	9.0	0	0.0
	Total	609	61	10.0	1	0.16

Second, there is no apparent relationship between irritations and pustules. That is, an increase in the frequency of irritations does not mean an increase in pustules. The greatest number of irritations was found in 1934-35 when a mixture of olive oil and mineral oil was used, yet the incidence of pustules that year was next to the lowest in the series.

There is no doubt but that some internal factor acts as a cause of erythema toxica. The incidence appears to be about the same irrespective of the external treatment. However, it is hard to believe that food can be responsible. Our custom is to put the babies to the breast after the

first twenty-four hours. Weighing before and after feedings usually shows that nothing is obtained for the first three days; frequently there is no measurable quantity of breast milk until the fourth day. Meanwhile the babies are given nothing by mouth except plain boiled water. The lesions of erythema toxica appear within the first twenty-four to forty-eight hours and have usually disappeared within four days. The minute amounts of colostrum taken by the infant during this time are at least unmeasurable by weighing the infant. It may be that something in the colostrum in the nature of hormones may be responsible, and it has been suggested that this is a pregnancy reaction. Babies with this condition show no other symptoms of any kind.

Other erythemas and intertrigo are due to outside mechanical irritations. For the first few days improperly laundered linen is the commonest cause. We learned that the first thing to do if any number of infants showed irritations was to check the laundry care. Invariably it would be found that on that day the washing solutions had been acid or alkaline instead of neutral. Our laundry foreman was very cooperative in this respect; besides washing all the shirts, diapers, and linen for newborn infants separately, he ran a daily reaction test on all solutions to see that they kept neutral. After the first week, circumcision was the chief cause of irritations. The skin of some newborn infants is sensitive to the antiseptics used to sterilize the field, and the skin of others is sensitive to the vaseline used in the dressings.

There was very little difficulty with intertrigo. Buttocks reddened from loose stools healed promptly when exposed to air and the heat from an ordinary incandescent bulb at a distance of 20 inches. Irritations caused by rubbing the face with the hands responded quickly after encasing the baby's hands in silk mittens. We had almost no intertrigo of the skin creases after the nursery was kept at a constant temperature. As an extra safeguard all clothes are removed from the baby in summer except the diaper, if, for any reason, the nursery temperature rises above 80 degrees.

There is no question but that nursing technique and the isolation of infants with initial lesions is one of the greatest factors in the control of skin lesions in the newborn. In the published studies of the last five years, shown in Table I, nearly all show improvement after certain different medical treatments had been instituted. However, in all of these cases the nursing care had been improved as well. In our series during the second year, with no change in routine treatment, the improvement of nursing technique alone reduced the incidence of pustules over 50 per cent.

As long as nurses and doctors have hands, these hands will irritate the delicate skin of the newborn infant and will occasionally carry infection. I believe that the occasional isolated pustule can never be

eliminated, but what can be done is to limit it to a single pustule and to confine it to one baby. We were never able in the six years to reach any definite conclusion as to why the occasional pustule developed. A baby with a perfectly clear skin would suddenly overnight develop a pustule, when no other baby in the nursery had one. If the affected baby is at once removed from the nursery, there is almost no chance of the lesion's spreading to other infants.

Our problem then resolves itself into eliminating the individual pustule. Various antiseptics have been used for many years to sterilize the skin of the newborn infant. Ammoniated mercury has been a standard initial prophylactic ointment for years. Chadwell's results have increased its use. Inasmuch as infants on our service continued to have pustules after its use, we first substituted olive oil as a bathing medium instead of water. The number of infants developing pustules remained the same although the frequency of irritations was less. With considerable trepidation it was decided to abandon the ammoniated mercury and all skin antiseptics for a year and to use olive oil alone. The irritations remained about the same, but the number of infants developing pustules actually decreased, giving us the lowest incidence we had had to date.

The following year a commercial baby oil was tried. Great claims have been made for this oil, but our results were unsatisfactory. Both the irritations and pustules were twice as numerous as they were the preceding year. In fact, the incidence of irritations and pustules was higher than in any previous year, except the first year before the nursing technique was changed. The only thing in its favor that we found was its pleasant odor. Many mothers object to the smell of olive oil. Therefore, we tried a mixture of olive oil and mineral oil for the next year. The odor of this satisfied the mothers, and the number of infants with pustules fell to the lowest point yet reached (only 0.1 per cent less than plain olive oil, however, and well within the limits of chance). The frequency of irritations, however, was increased.

Beginning in 1935 (the following year), with some hesitation, we decided to leave the skin of the newborn infant entirely untreated. The excess blood was gently wiped off, and nothing further was done. This method has been so satisfactory that we have continued it since.

The number of irritations is practically the same as it was with the olive oil alone, ammoniated mercury and olive oil, and ammoniated mercury and water. This would lead one to believe that 10 per cent is about the base line of the number of irritations appearing on the skin of a newborn infant irrespective of the treatment. That is to say, that in the presence of good nursing technique and laundry control, 10 per cent of all newborn babies' skins will show irritations of some sort.

The most astounding result was the practical absence of pustules. During the study year only one pustule was found on one baby. The table of results ends on Aug. 1, 1936. Since that time and up to January 1, 1937, we have had but one more baby develop a pustule. Beane has recently reported similar results.

It is apparent, therefore, that the skin of the newborn infant, if left alone, and not injured by rubbing with an antiseptic, or irritated with washings, tends to clear itself and seems to give some immunity to infection. From a physical standpoint the skins of these newborn infants are much more pink and healthy appearing than are those washed with oil or water.

This procedure is desirable not only because of decreasing infections and irritations of the newborn infant's skin, but also because of the time saved, which otherwise would be wasted in washing the infants. It is surprising how much time it takes to wash or oil the skin of a number of newborn babies. This can all be eliminated, and the nurses' time can be devoted to other things. Certainly, antiseptics and oil must cost something, and the saving to a large hospital should be considerable.

CONCLUSIONS

1. Nursing technique is the greatest factor in the care of the skin of the newborn infant. This includes aseptic control and isolation of infants with irritated skins.

2. Even with the above technique, about 10 per cent of all newborn infants will show some skin irritation.

3. Pustules may be practically eliminated by the nursing technique outlined above: wiping off the excess blood on the newborn infant's skin at birth and not touching the skin further for the first nine days. After this, olive oil or mineral oil may be used for the daily bath.

REFERENCES

1. DeLee, Joseph B.: Year Book, Chicago, 1929.
2. Chadwell, O. R.: New England M. J. **199:** 983, 1930.
3. Doty, Chester H.: Hospital Management **34:** 37, 1932.
4. Carter, H., and Osborn, H. A.: British M. J. **1:** 465, 1936.
5. Adams, Henrietta M.: Am. J. Nursing **35:** 811, 1935.
6. Guy, W. H., and Jacob, F. M.: J. A. M. A. **102:** 840, 1934.
7. Potter, R. T., and Abel, A. R.: Am. J. Obst. & Gynec. **31:** 1003, 1936.
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952 North Michigan Avenue

AURAL COMPLICATIONS OF PNEUMONIA IN CHILDREN

CHARLES EMORY TOWSON, M.D.
PHILADELPHIA, PA.

THE object of this paper is to detail certain observations in regard to middle ear and mastoid disease complicating pneumonia in children; to compare the findings with other reports in the literature; and, if possible, to draw certain conclusions.

The study is based on a series of hospital patients treated at the Jefferson Hospital and does not include patients treated at home. The findings might vary to some degree if all classes were included. On the other hand, as far as the virulence of the disease, the amount of involvement, and the degree of illness of the patient are concerned, the ward patient makes a good study.

Between the years 1930 and 1934, inclusive, there were admitted to the hospital 354 pneumonia patients between the ages of one month and ten years. Of these, 118, or 33⅓ per cent, had aural complications. Hill,[1] in a study of 1,187 cases of pneumonia occurring in Infants' Hospital, found 28 per cent with aural complications and, in Children's Hospital, in a series of 774 cases, 15 per cent. He also observed over a period of ten years a yearly average of 4 to 50 per cent. Moody[2] found otitis media in 34 per cent of 375 cases of pneumonia in children at the Los Angeles General Hospital (32 per cent in bronchopneumonia; 38 per cent in lobar pneumonia). Thompson,[3] in a study of 245 pneumonia cases on the pediatric service of Albany Hospital, observed 16.7 per cent with aural complications. In my present series 88 patients with bronchopneumonia (34.11 per cent) and 30 patients with lobar pneumonia (31.25 per cent) had aural complications. Of the total number of pneumonia cases 258 (72.9 per cent) were bronchial and 96 (27.1 per cent) were lobar. Accordingly, the chances for aural complications are about even for bronchial and lobar pneumonia. Also the fact might be mentioned that bronchopneumonia occurred approximately three times as frequently as lobar pneumonia.

TABLE I

NAME	NO. CASES OF PNEUMONIA	PERCENTAGE OF AURAL COMPLICATIONS
Hill	1,187 (up to 2 yr.)	28.0
Hill	774 (2 to 12 yr.)	15.0
Moody	375	34.0
Thompson	245	16.7
Towson	354	33.3

Sex.—The incidence was higher in the males, 66 cases (55.9 per cent) than among the females, 52 cases (44.1 per cent).

Read before the Philadelphia Laryngological Society, March 2, 1937.
From the Department of Otology, Jefferson Hospital.

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Race.—Among the white children there were 84 cases (71.2 per cent), and among the colored children there were 34 cases (28.8 per cent).

Age.—Of the 118 cases with aural complications, 74 (62.7 per cent) occurred in patients from one month to two years old (20.9 per cent of the total number of cases of pneumonia), and 44 (37.3 per cent) in the age group from two to ten years (12.4 per cent of the total number of cases of pneumonia). There was one patient one month old and two patients ten years old.

TABLE II

AGE INCIDENCE OF OTITIS MEDIA IN PNEUMONIA

NAME	UNDER 2 YR.	2 TO 10 YR.	2 TO 12 YR.
Hill	28%		15%
Towson	20%	12%	

As already mentioned, the highest percentage of incidence of otitis media occurred in children under two years of age. As is well known, the anatomy of the eustachian tube of the very young child favors the development of middle ear infection. While the tube in the adult is 36 to 37 mm. long, in the infant it measures about 14 mm. In the infant the tube is more open than in the adult, and it runs horizontally from the pharynx to the tympanic cavity, whereas in the adult it is angulated at the isthmus. In the infant the floor of the tympanic cavity is slightly lower than the floor of the nose. In the adult the tympanum is about 20 mm. above the floor of the nose. Infection enters the straighter, more open, and shorter tube of the infant more readily than the narrower, angular eustachian tube of the adult. Adenoids and tonsils in young children also may be mentioned as a contributing factor.

There is a *seasonal variation* in the occurrence of pneumonia and, therefore, in otitis media as a complication; most cases occur during the winter and spring months.

While in this series, which covers only a five-year period, no attempt will be made to show *yearly variation* in otitis media, it will be of interest to note the findings of Hill,[1] of Boston, covering a period of eleven years, from 1915 to 1925, inclusive, as shown in Table III. Without

TABLE III

YEARLY VARIABILITY OF OTITIS MEDIA (IN PERCENTAGE)
(FROM STUDY MADE BY DR. LEWIS WEBB HILL, BOSTON)

HOSPITAL	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	AVERAGE
Children's	10	8	24	6	17	45	6	18	16	16	4	14
Infants'	11	20	50	23	24	25	31	38	45	14	15	28

scientific facts, one would probably be justified in stating that the wide variation was due to the fluctuation in the virulence of pneumonia in different years and also to the yearly variation in the severity of influenza.

Associated Complications.—It is of interest to note not only complications relevant to pneumonia and otitis media, but also separate and distinct conditions associated with these cases as we find them in the ward. First, of those relevant to pneumonia and otitis media, such as gastroenteritis, cervical adenopathy, sinusitis, tonsillitis, meningitis, mastoiditis, cerebellar abscess, and pulmonary abscess, there were 62 cases (52.5 per cent). Second, of those unrelated conditions, such as measles, chickenpox, rickets, vaginitis, erysipelas, impetigo, and hydrocephalus, there were 21 cases (17.8 per cent).

OTITIS MEDIA AND MASTOIDITIS

Distribution of cases as to right- or left-sided otitis media: 74 (63.8 per cent) were bilateral; 23 (19.8 per cent) were right-sided; 19 (16.4 per cent) were left-sided; and 2 patients had mastoiditis without otitis media. From these figures one could state definitely that otitis media in cases of pneumonia is bilateral in the great majority of cases.

Of the 116 cases of clinical otitis media, there were 19 cases of mastoiditis (16.4 per cent). Of these, 8 cases were bilateral; 3, right-sided; and 8, left-sided. Of these 19 patients, 18 were operated upon, making 15.5 per cent of the total cases of otitis media with mastoidectomy. Seven were bilateral; 3, right-sided; and 8, left-sided.

For one case mastoidectomy was advised, but the patient was taken from the hospital. In addition to this, there were two cases of bilateral mastoiditis, revealed at postmortem examination without otitis media, bringing the total number of aural complications to 118.

It is of interest to note the number of patients having aural disease for the first time. One hundred three patients (87.3 per cent) gave no history of any previous attack. Thirteen (11 per cent) had at least single attacks previously. Two patients (1.7 per cent) had no available record.

The relationship between spontaneous ruptures of the membrana tympani, early myringotomies, multiple myringotomies, and surgical mastoiditis has for a long time been a subject of great interest and importance. First, let us consider the eighteen patients who were operated upon and one patient refusing operation. What procedure was adopted in these cases for the drainage of the tympanum?

In four cases the eardrum ruptured spontaneously, and no reincision was made. In one of the four the left drum ruptured spontaneously, and a right myringotomy was done. The left mastoid was operated upon. In another case myringotomy was performed following spontaneous rupture on the left side. Two myringotomies following spontaneous rupture were done on the right side. A left mastoidectomy only was done. The same treatment was carried out for both ears except that the right had one more incision than the left. In five cases multiple myringotomies

TABLE IV

METHODS OF MIDDLE EAR DRAINAGE IN PATIENTS DEVELOPING SURGICAL MASTOIDITIS

CASE NO.	SPONTANEOUS RUPTURE		NO. OF MYRINGOTOMIES		MASTOIDECTOMY
	RT.	LT.	RT.	LT.	
1			2		Rt.
2		1			Lt.
3			2	3	Bilat.
4			1	1	Bilat.
5		1	2		Rt.
6	1	1	2	1	Lt.
7				2	Lt.
8			1	1	Bilat.
9				1	Lt.
10	NO RECORD		NO RECORD		Bilat.
11	NO RECORD		NO RECORD		Lt.
12	NO RECORD		NO RECORD		Bilat.
13			1	2	Bilat.
14		1	1		Lt.
15			1		Rt.
16		1			Lt.
17	1	1			Bilat.
18			2	1	Lt.

were performed; in six cases a single myringotomy was done; and in three cases there were no records available of incisions or spontaneous ruptures.

From this group no conclusions can be drawn since surgical mastoiditis developed regardless of what method of drainage was procured, namely, spontaneous ruptures, with or without additional myringotomy, and single and multiple myringotomies.

Of the 97 patients with otitis media who did not develop surgical mastoiditis:

TABLE V

METHODS OF MIDDLE EAR DRAINAGE IN PATIENTS NOT DEVELOPING SURGICAL MASTOIDITIS

	NO. CASES
Spontaneous rupture only	
Bilateral	13
Unilateral	12
Single myringotomy only	
Bilateral	18
Unilateral	24
Multiple myringotomies (2 or more)	
Bilateral	11
Unilateral	2
Single myringotomy on 1 side, multiple on opposite side	2
Spontaneous rupture and myringotomy	
Spontaneous rupture on 1 side, 1 myringotomy on opposite side	2
Spontaneous rupture and myringotomy on 1 side, 1 myringotomy on opposite side	3
Spontaneous rupture and multiple myringotomies on 1 side, 1 myringotomy on opposite side	1
Spontaneous rupture on 1 side, multiple myringotomies on opposite side	1
Spontaneous rupture on 1 side, multiple myringotomies bilaterally	1
No opening in drum	4
No record	3

Twenty-five patients had spontaneous rupture only; 3 patients had spontaneous rupture of one eardrum followed by bilateral myringotomy in each case; 1 patient had left spontaneous rupture and 4 myringotomies of left drum and 2 of the right; 1 patient had right spontaneous rupture followed by 2 myringotomies of the right and one of the left eardrum; 3 patients had spontaneous rupture of one eardrum, and myringotomy was performed on the opposite side; 42 patients had single myringotomies only (18 bilateral, 12 right, and 12 left); 13 patients had multiple myringotomies (from 2 to 4); 3 patients had no record; and 4 patients had no opening in the eardrum.

In this group, since 75 per cent had myringotomies either before or following spontaneous rupture, one might conclude that establishing free drainage of the middle ear cavity by incision is good prophylaxis.

SYMPTOMS

Temperature elevation occurring with the development of otitis media. It is interesting to note the increase of fever at the onset of middle ear involvement. This was observed in 101 cases (85.6 per cent). In 8 cases (6.7 per cent) there was no change. In 9 cases (7.6 per cent) apparently there was no record. Some authorities believe there are no symptoms with the onset of otitis media in pneumonia.

Baum[4] states that otitis media in pneumonia is not uncommonly symptomless, is at first characterized by a thickened pink eardrum which is later white or pale yellow and appears to be bulging, but "landmarks in the region of Shrapnell's membrane are not always entirely obliterated." He feels that very few rupture spontaneously, that a discharge does not always follow incision, and that when it does follow, it is seldom profuse and gives no relief to the patient. He believes that the pneumonia type of "otitis media associated with pneumonia is probably only a local manifestation of a general disease, in itself not being highly important." He says further, "Improvement is likely to be dependent on development of a systemic immunity to the pneumococcus, resolution of the otitis taking place simultaneously with the resolution of the pulmonary process."

Wicht[5] also believes the otitis media is generally symptomless but that, when the drum shows a fullness, seropus or mucopus will be evacuated with myringotomy. He continues: "Having punctured the tympanic membranes (the condition is frequently bilateral), the patient may react in one of two ways. Within two days the temperature begins to settle, the symptoms to improve, and although otorrhea may persist for a week or two, there will be no question of further surgical treatment. On the other hand, if no improvement occurs within forty-eight hours,

there is strong presumption of mastoid involvement, and one should not delay exploring both mastoids, if necessary.''

Observations in this group would lead me to agree with Wicht—that most of the cases are relieved by myringotomy and that pus usually is evacuated.

TIME RELATIONSHIP BETWEEN THE ONSET OF OTITIS MEDIA AND PNEUMONIA

Fourteen cases occurred simultaneously with the onset of pneumonia; 36 cases occurred from one to eight days after onset of pneumonia; 14 cases occurred ten days after onset of pneumonia; 13 cases occurred two weeks after onset of pneumonia; 9 cases occurred three weeks after the onset of pneumonia; and 6 cases one month, 3 cases six weeks, and 2 cases eight weeks after pneumonia.

TABLE VI

TIME ELAPSING AFTER ONSET OF PNEUMONIA WHEN OTITIS MEDIA DEVELOPED

NO RECORD	SIMULT.	1 TO 8 DA.	10 DA.	14 DA.	21 DA.	1 MO.	6 WK.	8 WK.
5	14	36	14	13	9	6	3	2

TABLE VII

TIME ELAPSING AFTER ONSET OF OTITIS MEDIA WHEN PNEUMONIA DEVELOPED

2 DA.	3 DA.	4 DA.	7 DA.	14 DA.	1 MO.	6 WK.	2 MO.	7 MO.
1	1	1	1	2	3	1	2	1

The fact that there were 13 cases of otitis media followed by pneumonia after an interval of two days to seven months brings up again the mooted question of which is primary, the middle ear infection or the pneumonia. Coates,[6] in 1927, discussing mastoid infection in the infant, made this summary: ''Is the middle ear and mastoid infection secondary to the systemic infection, and, if so, is it due to a consequent lowered resistance or to forcible injection of infected material through the eustachian tube, or to both?''

Coates[6] states further: ''We must remember that pneumonias, at least of a certain type, have been attributed by creditable observers to infections in the nasal accessory sinuses or in the middle ear and mastoid, and certainly autopsies performed on victims of influenza in the army epidemic of 1918 disclosed a surprising number of middle ears and mastoids that contained purulent secretion. Was this the cause of death in those ''flu'' cases? Most of them during life were symptomless as regarded the sinuses and ears.''

To quote Coates again: ''As far back as 1868, Wreden observed that at autopsy of year-old infants dying of bronchopneumonia, the middle ears and antra showed evidence of inflammation or infection, but attributed this condition to the pneumonia and did not regard it as the cause of the latter. These observations were confirmed by Rasch (1897), who found inflammatory conditions of the ears in 42 out of 43 children

having died of bronchopneumonia, and Ponfick reported the same results in 10 out of 11 autopsies. This situation is attributed by Friedrich, Gomperz, Alexander, and others to the fact that the undeveloped ear of infancy is especially prone to infection in any disorder which reduces the individual's normal resistance and interferes with nutrition, and they include in this category malnutrition, pneumonia, various intestinal affections, rachitis, tuberculosis, syphilis, and others. Friedrich suggested, in 1900, that this process may be reversed and that the ear infection may be primary and the systemic manifestations secondary."

This latter thought is certainly strongly suggested by several cases I have just recently seen admitted to the hospital with diagnosis of pneumonia and otitis media; as soon as the eardrums were opened and the pus was evacuated, the temperatures dropped.

J. D. Wicht,[5] in 1935, expressed the opinion that ". . . many severe illnesses in children presenting symptoms referable to the chest or gastrointestinal tract are directly caused, or gravely aggravated, by a type of middle ear infection which, in the absence of very careful otologic examination, would most certainly be missed."

In 1930 Helwig and Dixon,[7] in a study of 38 autopsies performed on children from seven days to nine years old, who had either bronchopneumonia or lobar pneumonia, observed middle ear or mastoid involvement, or both, in every case. In some of these cases the pneumonia was primary, and in others it was secondary to diseases other than those of the middle ear or mastoid.

Leslie[8] stated, "It is interesting to note that, in general pneumococcus infection in children, Netter found that otitis media was by far the commonest primary lesion, occurring as such in as many as 29 out of 46 cases examined, while in the same series bronchopneumonia was the primary lesion in but 12 cases, and lobar pneumonia in only one instance."

Lierle,[9] in 1929, stated that cases of otitis media frequently occurring in infants suffering from pneumonia are rarely hematogenous in origin.

Fernandez[10] stated in his summary: "The middle ear and mastoid have a definite place in acute infections of children in many cases where there is involvement of the gastrointestinal and respiratory organs. They also play a double rôle: (a) Toxic, (b) direct infection by causative drainage through eustachian tube—or both. In chronic or recurring intestinal toxemias, the mastoid may act by focal infection, undermining the health of the child and flaring up periodically."

TIME RELATIONSHIPS IN OTITIS MEDIA AND MASTOIDECTOMY

In one-half the cases two to four weeks elapsed between the onset of otitis media and mastoidectomy and in the rest the time interval was between five days and three months.

Healing time in cases of otitis media averaged 28.3 days. The majority healed in from fourteen to twenty-eight days.

TABLE VIII

HEALING TIME IN CASES OF OTITIS MEDIA WITHOUT MASTOIDECTOMY

TIME (DAYS)	NO. OF CASES
3	2
5	1
6	2
7	4
10	4
14	10
21	11
28	13
45	4
60	6
90	1
120	2

NOTE.—In 13 cases there was no record; 25 patients died with the ear still draining; in 2 cases there was no otitis media, mastoiditis being revealed at postmortem.

Healing Time of Mastoid Wounds.—The average time was 11.8 weeks.

TABLE IX

HEALING TIME OF MASTOID WOUNDS

TIME (WK.)	NO. OF CASES
4	1
5	1
6	4
8	1
12	2
26	1
39	1

NOTE.—In 5 cases there is no record; 2 patients died with wounds unhealed.

The reason for the delayed healing time is probably the weakened condition of the patient, the lowered resistance, and the slow recuperative powers resulting from pneumonia. Some of the patients had other serious complications.

In late years we have learned not to depend for diagnosis upon the classical signs of mastoiditis: redness, swelling, tenderness, and pain over the mastoid. Formerly, the majority of cases were not diagnosed surgical mastoiditis until the classical signs appeared; today, with better methods of diagnosis, seldom is that stage awaited. As a matter of fact, the majority of cases would never reach it. In the cases in which erosion through the cortex occurs relieving pressure within the mastoid by formation of subperiosteal abscess, as a rule, surgery is not as urgent as in others in which this does not occur. In this series 2 cases showed classical signs; 17 did not; and of 2 cases there was no record.

DIAGNOSIS

X-ray Findings.—From the x-ray reports it would appear that the x-ray diagnosis alone in acute mastoiditis is not final either positively or negatively. In other words, x-ray is only a help, and the final diag-

nosis must depend on the clinical picture, with the x-ray findings as a laboratory aid only. I have seen many cases with marked pathology found at operation, in which the x-ray plate showed very little. This attitude toward the x-ray findings, I believe, coincides with the views of most otologists.

TABLE X

X-RAY FILMS

X-RAY REPORT	CASES O. M.	CASES SURGICAL MASTOID
None taken	60	3
Negative	12	3
Mastoids undeveloped	2	
Slight cloudiness	12	4
Cloudiness	7	6
Cell walls broken down		2
Sclerotic	4	

NOTE.—There was bilateral cloudiness in 1 case in which operation was refused. No x-ray films were made in the 2 cases in which mastoiditis was revealed postmortem.

Bacteriologic Findings.—The causative bacterial organism in otitis media is always an important factor. We were not able to get growths in every case. In the cases in which cultures showed growth the organisms were as follows: one, taken postmortem, was pneumococcus, bilaterally; another was streptococcus hemolyticus, bilaterally; the majority of the remainder were *Streptococcus hemolyticus* or *nonhemolyticus* plus one or two other organisms, as *Staphylococcus albus* or *aureus, B. proteus,* diphtheroid bacillus, or *B. alkaligenes.*

Cultures of mastoids showed a great predominance of *Streptococcus hemolyticus.* In twelve out of eighteen cases this group was found. One case showed pneumococcus plus *Staphylococcus albus;* another, *Streptococcus nonhemolyticus* plus *Staphylococcus albus;* another *Staphylococcus aureus.*

COMMENT

The subject of exposure of the sigmoid sinus and the dura is interesting and important with regard to the possible spread of the infection to the dura and the lateral sinus. In this small series of mastoidectomies, there were too few exposures to draw any definite conclusions. There were 5 cases with dural exposure and 5 cases with sinus exposure. None of these were followed by intracranial complications. My experience is that the danger of spreading infection is practically nil provided that the exposure is large enough for good drainage.

Intracranial complications were as follows: (1) Perisinus abscess—one case, with recovery; (2) septic sinus thrombosis, meningitis, cerebellar abscess, and pulmonary abscess—one case, with death; (3) lateral sinus thrombosis—one case, with death with symptoms of meningitis (however, sinus thrombosis was given as the cause of death; there had been no exposure of the sinus; and there was no postmortem).

The *mortality* of the cases of pneumonia with otitis media was 27.9 per cent. Four deaths (3.3 per cent) were due to mastoiditis, including 2 in patients in whom postmortem examination revealed mastoiditis without otitis media. In 29 cases (24.5 per cent) death was due to pneumonia.

Of the 18 patients upon whom mastoidectomy was performed, 2 died—one with meningitis and sinus thrombosis and one with septic sinus thrombosis, meningitis, cerebellar abscess, and pulmonary abscess.

That the presence of tonsils and adenoids influences the incidence of otitis media is beyond question, but nothing can be shown in this study, as most of the patients were under the usual age for tonsillectomy. Tonsils were present in 115 patients (97.4 per cent) and absent in 3 patients (2.6 per cent).

In this series two postmortem examinations showed mastoid infections without any evidence of middle ear infection, either clinically or at autopsy. In one case organisms resembling pneumococcus were found. In both cases mastoiditis evidently followed pneumonia.

One is convinced that frequent examinations of the ears should be made in pneumonia cases because of the quite general absence of symptoms, although in this series a high percentage of the patients showed elevations of temperature. In cases of pneumonia or severe upper respiratory infections complicated by otitis media, neither of which seems to be progressing satisfactorily, prompt consideration should be given to mastoid drainage.

SUMMARY

Thirty-three and one-third per cent of the patients up to ten years of age with pneumonia suffered aural complications. Twenty and nine-tenths per cent occurred in children under two years of age, and only 12.4 per cent in those between two and ten years. The incidence of aural disease was about equal in bronchopneumonia and lobar pneumonia.

In this series 71.2 per cent of the patients were white; 28.8 per cent, colored; and 55.9 per cent were male; 44.1 per cent, female.

The majority (62 per cent) of the cases of otitis media were bilateral. Sixteen per cent of the cases of otitis media developed into mastoiditis; 87.3 per cent of the patients had otitis media for the first time.

Early surgical drainage of the middle ear cavity by myringotomy in the presence of a bulging drum head is good practice. Most cases of otitis media in pneumonia, although otherwise symptomless, will show an added elevation of temperature. Evidence from this study points to pneumonia as the primary disease.

Most cases of surgical mastoiditis develop between two and four weeks following the onset of otitis media.

The healing time of otitis media and mastoiditis depends a great deal upon the virulence of the infection and the resistance of the patient.

X-ray films in acute mastoiditis are nothing more than a laboratory aid in diagnosis and must not distract one from his clinical diagnosis.

Dural and lateral sinus exposures are not dangerous provided that ample drainage is maintained by a sufficiently large exposure. Intracranial complications occurred in 2.5 per cent.

Streptococcus, of one or another group, was the organism most commonly found.

Postmortem examination showed mastoid disease even without evidence of middle ear involvement.

The mortality for aural disease was 3.3 per cent; this figure includes 2 cases of mastoiditis found at postmortem. Without these 2 cases it was 1.6 per cent.

Recognition is here given to Prof. E. L. Bauer, on whose pediatric service these patients were treated, for his courtesy in making this study possible.

REFERENCES

1. Hill, Lewis Webb: Boston M. & S. J. **196**: 107, 1927.
2. Moody, E. Earl: California & West. Med. **34**: 340, 1931.
3. Thompson, Hugh C., Jr.: Arch. Pediat. **53**: 529, 1936.
4. Baum, Harry L.: Arch. Otolaryng. **21**: 96, 1935.
5. Wicht, J. D.: South African M. J. **9**: 536, 1935.
6. Coates, George Morrison: Ann. Otol. Rhin. & Laryng. **36**: 913, 1927.
7. Helwig, Ferdinand C., and Dixon, O. Jason: Arch. Otolaryng. **11**: 169, 1930.
8. Leslie, R. M.: Pneumonia, Revised by Browning Alexander, London, 1924, William Heinemann (Medical Books), Ltd., p. 141.
9. Lierle, D. M.: J. Iowa State M. Soc. **19**: 406, 1929.
10. Fernandez, J. R.: New Orleans M. & S. J. **83**: 474, 1931.

Medical Arts Building

PUBLIC HEALTH METHODS IN A PRIVATE SCHOOL

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THE term "public health" usually connotes mass control of the health, diseases, and sources of disease in communities whose members live in such a way that certain infections as tuberculosis, typhoid, rheumatic fever, or conditions such as malnutrition and rickets are certain to flourish. We seldom think of groups of individuals of comfortably situated families as susceptible of consideration in terms of public health; yet the handling of groups of boys and girls attending private schools offers an opportunity of applying these principles in an interesting way. Problems such as those arising from insanitary conditions, or from contaminated water or milk supplies are not likely to confront a private school physician; nor is he liable to be confronted by an epidemic of a major communicable disease such as meningococcus meningitis. But the health service in the school should be so organized that information as to the illness of any child should be immediately available to the physician, who, if occasion arises, can institute any measures indicated to protect the health of the other pupils. Also, private school physicians have the opportunity of trying to bring individual children to their optimum condition of physical health, and of handling outbreaks of communicable diseases under nearly ideal conditions.

The school physician in order to do a thorough piece of work must have an attitude which is rather different from that of the ordinary practicing physician. He must be interested primarily in the normal child, in detecting early, minor deviations from the normal, and in considering each child not only as an individual but in his or her relation to schoolmates. This point of view could be called a mature one; certainly it is not often enough found in the recent medical graduate.

Because children attending private schools are for the most part well cared for, uncorrected major deviations from the normal are found less frequently than in public school children. It is impossible to define a normal child; there is no set mold to which every child must conform, either physically or emotionally; yet there is an optimum state for each individual, and the school physician must have this continally in mind. In general, one can say that a child in his optimum state of health enjoys both school and recreation, does not tire easily, sleeps and eats well, and is well adjusted to both home and school surroundings. The alert teacher is often the first to notice any change from this state, and can bring it to the attention of the school physician, who in turn should convey the information to the child's parents.

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The private day school physician has a unique and sometimes difficult position. Unlike the public school physician he has no weight of authority behind him to insist on individual measures. Everything he does must be considered not only in relation to what he wants to accomplish for the group as a whole as well as each child, but also in terms of how his judgment and suggestions will react on the child, the school authorities, the parents (whom he may not know personally), and particularly the family's physician. The public school physician has primarily to detect the presence of communicable diseases in the pupils, and to control the spread of contagious diseases. Because of the large number of children under his care, he can have in the nature of things little concern with either the minor contagious diseases, or over matters other than the obvious which affect the health of the individual. The health supervision in the public schools is better than it was, but is far from ideal. One doctor in New York City may have as many as twelve schools in his charge, each one with 1,500 pupils. The nurses do as much as possible to follow up the cases, but it is utterly impossible for them to do everything.

The physician to a boarding school has a position in relation to school and family which is also different from that of the private day school physician. The health and medical problems are probably similar to those found in a day school, but the handling of them is different in that the treatment of various acute and chronic conditions must be managed by him on the spot, whereas, with day school pupils the responsibility rests with the family physician. In other words, actual treatment or specific advice as to treatment is clearly not the function of the day school physician.

The training and experience obtained through the work of a school physician is invaluable for a pediatrician. It seems self-evident that the school doctor should be a children's specialist, and one who has already had training and experience. It seems equally obvious that a girls' school should have a woman physician and that a boys' school should have a man. This applies particularly to the children approaching puberty and those who are adolescent, since they are the most puzzling and difficult to evaluate both physically and emotionally of any age group. Probably only a man who is old enough to have watched his patients and daughters through adolescence would have the imagination and interest to perceive problems of adolescent girls as they arise, and I doubt if many women would feel adequate to the task of helping boys of this age.

It is possible to define the objectives of a health service in a private school.

1. The school itself is interested primarily in having educable material and realizes that a child who is below his optimum state is less teachable and does less good work than the perfectly healthy child.

2. The school, to be an efficient educational institution, must have as low a percentage of absenteeism as possible.

3. The school must know the causes of absenteeism, since unless the reasons for absences are known it is impossible to affect in any way the fourth objective, which is

4. The control of absenteeism.

The physician functions in attempting to attain the objectives of the school:

1. By yearly examination of each child to evaluate the health status, aiming always to determine the child's optimum condition and the probable causes of deviation therefrom.

2. By encouraging by suitable means the correction of any defects found.

3. By keeping accurate, up-to-date records of past and current illnesses.

4. By being prepared to take suitable measures to protect the other pupils when communicable disease develops in a child.

5. By keeping the school administration and individual teachers informed of the physical status of the pupils, particularly when defects are present which should modify the handling of the child during school hours.

In one of the private day schools for girls in New York a plan has been evolved over a period of many years which functions with considerable efficiency and with little friction or antagonism between parents and school, parents and physician, and the school and family physician. Such a plan requires five fundamental factors without any one of which the scheme could not operate: First, and perhaps most important, a school administration with sufficient breadth of vision to cooperate with any intelligent plan reasonably presented by the school physician; second, a school physician who is primarily a pediatrician actively interested in the health aspects, collectively and individually, of child life; third, an intelligent trained nurse to assist the physician, to do first-aid work and to keep detailed records; and fourth, the cooperation of the physical education department. Since recreation and exercise when rationally carried out add definitely to the health of children, the work of the physical education department is inseparable from the phases which occupy the attention of the physician and nurse. Fifth is the cooperation of the family and its physician.

The plan as worked out in this school is as follows.

Before entry, the parents of each child are asked to fill out a simple history form, which includes information about the contagious disease, as well as other illnesses, accidents or operations, and any prophylactic measures which have been given. A certificate of vaccination against smallpox must be filed in accordance with the New York state law, which

requires that every child on admission to school in first and second class cities must have been vaccinated. The head of each school, whether public or private, is held responsible.

In addition, the school requests a statement from the child's physician that she is Schick negative. About three years ago a campaign was started, to try to see that the whole school was immune to diphtheria. The status of the question is shown in Table I.

To accomplish this letters were written to the parents of children not known to be immune, stating the objective very simply, explaining its importance, and asking them to take the child to her physician for

TABLE I

DIPHTHERIA IMMUNIZATION

ENROLLMENT	1933-4	1934-5	1935-6
	382	382	384
Schick negative	269 (70.5%)	296 (77.4%)	316 (82.5%)
No Schick immunization	26 (6.8%)	24 (6.4%)	22 (5.1%)
No second Schick test	82 (21.4%)	54 (13.0%)	39 (10.1%)
Positive after injection	5 (1.3%)	8 (2.1%)	7 (1.8%)

the injections or for the test. The response has been rather gratifying. Only one physician, as far as we know, told the mother that a Schick test after the injections was not necessary, and only one parent has refused point-blank to have the test done on the grounds that his child was so sheltered and protected that he did not expect her ever to be exposed to diphtheria. We feel that the family physician should assume the responsibility of seeing that his patients are immune to diphtheria, but since some are diffident about summoning patients back for specific procedures, possibly because there is considerable changing from physician to physician, we feel that the school is justified in stimulating the families to go to their doctors to ask to have it done. The small percentage of children who remain Schick positive is the justification for asking for a negative Schick test, rather than being content with the injections. One child in the school has had three series and is still positive. Another, who received the injections in 1927 with a subsequent negative Schick test, was found to be positive in 1934. This has been true in two others. Perhaps it would be wise to have Schick tests done at intervals, just as vaccination against smallpox should be attempted every so often.

We shall not be entirely satisfied until the whole student body is known to be immune to diphtheria, and eventually we may be able to demand on entry a certificate on this point just as we do for smallpox vaccination. Our figures, however, compare favorably with a sampling survey of public school children recently reported by the New York Department of Health, which found that 63 per cent of children under six years of age living in congested areas of the city had been protected against

diphtheria. The report does not state whether this means that the children were Schick negative or simply that they had received the immunizing injections.

The question of immunity to scarlet fever has not been pursued in the way that the diphtheria question has been. It has seemed to us that because the value of immunizing procedures against the disease are not yet on as sure a basis as are those in diphtheria, and, because the mortality and morbidity rates are relatively low, we are not justified in asking the parents to have Dick tests done. If there should ever be an outbreak in the school, we should probably attempt to find out which of the exposed children were susceptible. In 1934 we had information that the Dick test had been done on 12, or 3 per cent of the children in the school.

Four years ago the school physician was notified by the attending physicians that three of the children in different families were ill with paratyphoid infections. It seemed important to make an effort to find out whether anyone in the school could have been the source of these illnesses. The one obvious thing to do was to examine all the employees who handled food in any capacity. This was done, and stool and urine cultures also made of all the food handlers. The results were negative, but this started the yearly routine examination, by the school physician, of all the maids. Particular care is taken in getting the history of any illness which might have been typhoid or tuberculosis, and venereal diseases. Frequency of colds is also noted, and the maids are not allowed to be in school with acute colds. A few conditions important to the maids individually have been found, and appropriate care arranged.

Except for the management of outbreaks of contagious diseases, which will be described later, these are the measures which are important to the group as a whole.

The plan for the supervision of the health of the individual children begins each fall with a fairly complete examination of each one. Certain physical measurements are taken including the weight and height, and the posture is examined in detail by instructors in physical education. The rest of the examination is divided between two physicians. The first tests the vision and hearing, examines the ears, nose, throat, skin, thyroid, and surveys the state of nutrition. The other, who is the school doctor, examines the heart, lungs, and abdomen, takes the blood pressure, and looks at the posture. This physician, with all the data at hand, evaluates the findings and gives each child a health rating, with a separate rating for the posture. If anything important is discovered, such as diminished hearing, or marked difficulty in reading the vision chart, the room teacher is notified immediately without waiting for confirmation of the findings by the family physician. Before notifying the family of any defects found efforts are made to determine whether the defect is known to the parents and whether steps have already been taken. This is done

to avoid the natural irritation which would otherwise follow. The whole examination takes about forty-five minutes. It would be desirable to make hemoglobin determinations, as well as urinalyses, on all the children, especially those in the middle and upper school, but it has not seemed advisable to undertake this. About a quarter of the girls each year are found to have some deviation from the normal which as far as can be found had not been known by the family. The outstanding finding numerically is difficulty with vision, and it is very interesting to follow the results of the vision test from year to year. For instance, a girl who at two preceding yearly tests had read the chart perfectly, this year read it at only about 0.2 of normal. The entrants, however, are those most likely to have uncorrected visual difficulties. Examinations by the oculists have revealed real trouble in a high percentage of cases. It would seem from these findings that a thorough examination by an oculist might well be considered a wise routine procedure for every child before entering school, and periodically thereafter.

For the most part the girls in this school are exceptionally well nourished, but each year about 4 per cent are so much below the average that the question is brought up to the parents. It is always possible to arrange a child's school program so that extra rest is provided or physical activities are cut down if the family physician advises it. The report about the child's nutrition is made largely on the basis of the school offering cooperation in any measures which the physician suggests.

Several girls in the school have diabetes, none has tuberculosis, and as far as known none has ever had it. Three girls, rather surprisingly, have definite rheumatic heart disease, and another was reported by her physician to have had rheumatic infection without the development of a heart lesion. The percentage of rheumatic children is then about 1 per cent.

The examination at school reveals occasionally more or less serious abnormal conditions not recognized by the family physician. For instance, this year, two girls were found to have persistently high blood pressure, which would be found only by taking blood pressure routinely. Another striking instance was of a fourteen-year-old who had been under the care of leading pediatricians all her life. She had a marked equinus deformity of both feet, so that she always walked on tiptoe. The mother knew that the child walked this way but, since no physician had ever said anything to her about it, had never had it investigated. The orthopedist to whom the child was taken felt that she must have had an unrecognized attack of poliomyelitis in infancy which led to the deformity. The condition has since been corrected, and she walks normally. The mother was quite positive in her statement that the child had never had her shoes and stockings removed when being examined by her physician after she began to walk. Nothing else could explain the failure to recog-

nize such an obvious condition. However, in a group of children such as those who attend this school, these instances are the exception.

The follow-up of the physical examinations made each year is done by writing reports, in the form of personal letters to the parents. These are only sent when something new is discovered, such as visual difficulties, loss of weight, enlargement of the thyroid, or if the teachers report that the child acts tired, or if she is noted not to eat the noon meal well. The report states that such and such a condition seems to be present and asks that the child be taken to her physician for confirmation of the findings. A report from the physician is requested, and a form is sent for this, so that the school will know that the matter has been taken up with him, and will not bother the family again about it. The number of responses varies somewhat from year to year, but 70 per cent or more can be counted on to cooperate. When no reply is received within a reasonable time, the school nurse asks the child whether anything has been done. Sometimes the family has simply forgotten to send in a report. If not, and the matter seems important, another note is written, or the head mistress gets in touch with the mother. The school physician never makes a positive diagnosis in the report and never goes any further than to ask to have the child see her own physician. Once the question reaches the family physician, the responsibility of the school ends. The health examination at the school has very definitely the effect of sending back to their physicians for examinations girls who otherwise would not see him except for an acute illness. This holds true particularly for the older girls.

The one physical condition which the school is prepared to handle up to a certain point is the posture of the girls. Really good body mechanics is almost the exception. A small proportion have such extremely bad posture that only rather intensive individual work is likely to help. Such girls are referred to their physician for advice. Occasionally a girl with bad posture has been so nagged about it that she has become bored and resentful—quite naturally. In such cases best results are obtained by dropping the matter, for a time, entirely. One such child now has one of the best postures in the school. Many children, particularly the flexible type, have functional curvatures of the spine. This does not necessarily call for intensive posture training, and often enough the curve disappears as the child passes through the period of rapid growth. Unfortunately, however, there seems to be no good way of telling which ones will go on to a more or less disabling deformity.

The physical education department manages the problem in this way. All the children in Class 1 are given posture teaching instead of regular gymnasium work. In every gymnasium class a short time is spent in posture instruction. Practically all of the girls in the school eventually learn what good posture is, even if they do not always maintain it. The

ones who need special work are put in small groups and are given posture work in place of gymnasium during most of the school year. When a girl fails to improve as she should after a period of posture training in school, the situation is discussed by the physical instructors and the school physician. All possible factors in the production of the poor posture are considered, especially vision, any chronic infection, psychologic

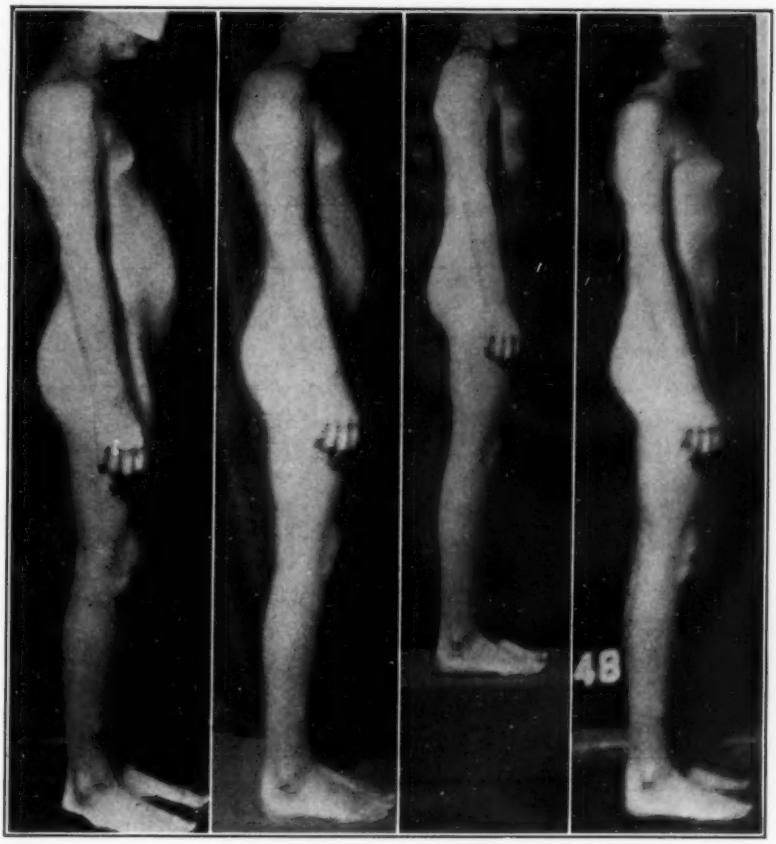

Fig. 1.—Photographs of a girl showing improvement in posture through the training given in school for three years.

difficulties, and fatigue. Physical training people are rather likely to think of posture as a static, set thing to which any individual can be trained. Physicians, on the other hand, are too prone to underestimate its importance, and very few really know what to do about it. A great deal in the way of preventing poor posture could be done by the pediatrician if he would keep it in mind and give simple instruction to the child and the mother as soon as the child starts to walk.

In this connection feet should be mentioned. It is rather shocking to find how many girls have weak feet of varying grades, from the slight to the most extreme. Undoubtedly the fact that city children walk on pavements and hard school building floors most of the time has something to do with this. Gymnasium departments are somewhat at fault, too, in the shapeless shoes which they recommend and which the children, because of lack of time between classes, particularly those in the lower grades who are too little to change quickly, wear most of the day, or at least during school hours. Fortunately the present fad is for low heels, so that this particular factor does not have to be combated very

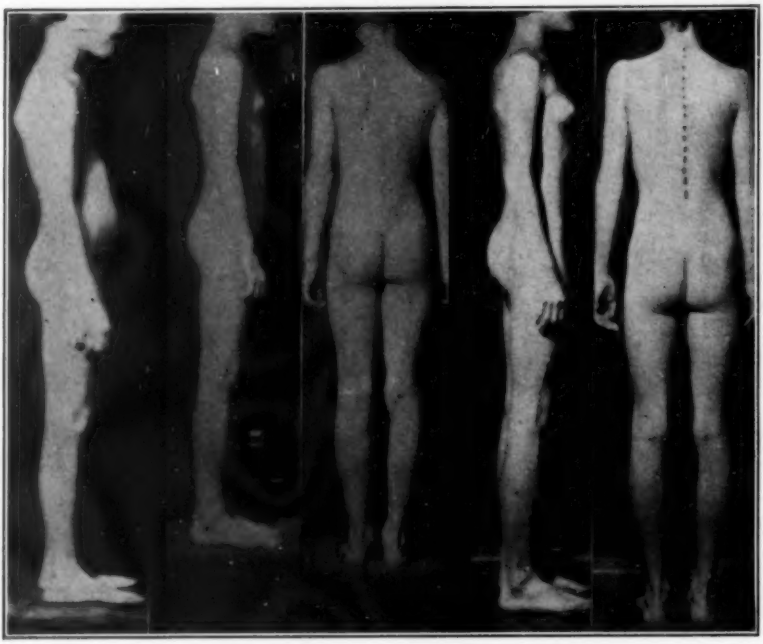

Fig. 2.—Photograph of another girl showing improvement in posture for four years.

vigorously, but it does seem that more attention paid to children's feet when they are little might help the situation somewhat.

What posture training in school can accomplish is shown in Figs. 1, 2, and 3.

Contagious diseases are the *bête noir* of all schools. Whether absolute control is possible is doubtful. Measures can be taken however which perhaps help in checking the spread of the disease, and which allow the minimum of absenteeism for exposure. The plan followed in this school is the one developed a number of years ago by the School Physicians' Association. When I first became connected with the school I was

skeptical about its efficacy, but I think I can show that from the point of view of the school it is worth while.

Diphtheria, scarlet fever, and whooping cough have never been problems, but exposures to measles, chickenpox, mumps, and German measles have had to be handled. A child exposed at home to any contagious disease whatever is excluded during the dangerous period. If she is exposed outside of school, but not at home, she is excluded unless the parents wish to have her examined daily before school by their physician and given a statement that she shows no evidence of illness. Exposures at school are considered the responsibility of the school and are assumed to be less complete than a home exposure. During the dangerous period the exposed susceptible children are examined by the school physician at school before classes begin. It has been found that these four diseases can be detected early. The children are sent home on the slightest suspicion, including a temperature of 99° F. or over, and have to remain

Fig. 3.—Photographs of the feet of two girls. Improvement was the result of posture training given in school during two years.

at home for three days. Even with chickenpox this precaution has kept out girls as much as three days before they developed the rash.

The findings from the epidemics of measles, mumps, and German measles last spring show what happens (Table II). Acording to Shaw,

TABLE II

	MUMPS	MEASLES	GERMAN MEASLES
No. susceptible exposed at school	311	121	185
No. cases developing	83 (26%)	43 (35%)	14 (7.5%)
No. exposed at home	19	6	3
No. cases developing	11 (58%)	5 (83%)	3 (100%)
No. days saved	2488	968	1480 Total 4936

from 25 to 50 per cent of exposed susceptible individuals will contract mumps; up to 90 per cent can be expected to come down with measles. No definite figures were available for German measles or chickenpox,

TABLE III

SUMMARY OF CAUSES OF ABSENTEEISM

	PUPIL SESSIONS	TOTAL DAYS LOST	%	COLDS			CONTAGIOUS DISEASES			INJURIES; OPERATIONS; OTHER ILLNESSES			NOT ILL; OUT OF TOWN; FUNERALS, ETC.		
				NO. DAYS LOST	% TOTAL DAYS LOST	% PUPIL SESSIONS	NO. DAYS LOST	% TOTAL DAYS LOST	% PUPIL SESSIONS	NO. DAYS LOST	% TOTAL DAYS LOST	% PUPIL SESSIONS	NO. DAYS LOST	% TOTAL DAYS LOST	% PUPIL SESSIONS
1930-1	55132	5217	9.4	2720	52.1	4.9	523	10.0	0.9	1309	25.0	2.3	665	12.7	1.2
1931-2	54152	7136	13.1	3159	44.2	5.0	657	9.2	1.2	1526	21.4	2.8	1794*	25.1	3.3
1932-3	48910	6266	12.8	3583	57.3	7.3	525	8.3	1.0	1701	27.1	3.0	454	7.3	0.92
1933-4	59021	6066	10.2	3218	53.0	5.4	494	8.1	0.88	373	6.1	0.63	857	10.6	1.4
1934-5	59325	6950	11.7	3015	43.5	5.0	2400	35.9	4.0	454	6.5	0.76	667	9.5	1.1

*This high figure is accounted for by poliomyelitis scare. Many of the girls were kept out of town for several weeks after the opening of school.

but the latter is known to be highly contagious. The table shows that allowing them to come to school apparently did not increase the probable minimum number of cases in the school. It also shows how much greater are the chances of contracting a disease from a home exposure. The only alternatives to this plan are allowing the children to continue at school regardless of exposure, a plan which would hardly meet with general approval, or excluding during the dangerous period all exposed susceptibles. The gain to the school of not following the policy of exclusion is shown by the number of school days saved.

The common cold causes more trouble than any other disease, and should be classed among the contagious diseases. In the past five years the percentage of absences from this cause has ranged from 4.9 to 7.2. The matters of ventilation and heating have been investigated, and are as good as modern methods can make them. As far as we now know, the problem is fundamentally one of exposure. No girl is allowed in school during the first three days of an acute cold. The homes cooperate very well in not sending children with colds to school and are reconciled to the policy of sending home any girl who shows signs during school hours of developing a fresh cold. For the first time this year the school has been willing to acknowledge that a teacher with a cold is as much a danger to the girls as is one of the pupils, and the teachers or anyone in close contact with the students are expected to stay away during the first three days of a cold. Whether this policy will influence the incidence of colds we do not yet know.

A summary of all the cases of absenteeism are shown in Table III. There are many other factors which might well be considered the province of those concerned with child health in schools. One of the most important is the matter of mental hygiene, or child psychology, or behavior—whatever one wants to call it. In the present uncertain status of this branch of therapy and because of the suspicious fear of the laity and of many physicians too, a satisfactory plan seems to be impossible. Certainly a child's behavior should be considered in relation to his physical status as well as his environment and emotional make-up. The teachers appreciate this and often refer the problem of a child who is doing poorly in school or is behaving in some unusual way to the physician to help in the solution. Such matters obviously cannot be managed by the school alone. The family physician who knows the child not only from the point of view of physical status but also from the point of view of her environment and family problems is the one in the best position to decide what is best to do.

A school and its physician are in a position to do a great deal for the health of children collectively and individually. The school health program should be an important factor in educating parents to demand that pediatricians help their children to attain and maintain an optimum state of health, rather than merely to treat them during illnesses.

Critical Review

ALLERGIC DISEASES

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PREVIOUS reviews have mentioned the tendency of enthusiasts to overwork the allergic theory as an explanation, or as the basis, for a host of clinical riddles. It is apparent to the reviewer that there is now a perceptible challenge or reaction in the literature to some of these claims. Up to this time skepticism may have been frequent enough, verbally expressed in sarcasm, but no constructive rebuttal has appeared in the literature.

Three books dealing with allergy were published during the past year. Durham,[1] who has made most of the ragweed surveys in Eastern United States, is author of the book, *Your Hay Fever*. The style is such as to give members of the lay group reliable information on a subject often difficult for them to understand. A background of the historical development of our knowledge and the methods of making pollen surveys furnish interesting reading. The book is less technical in its approach than is the book by Wodehouse[2] (reported last year). Both books are inadequate on the pollen problem of the Pacific Coast.

Allergy of the Nose and Paranasal Sinuses is the title of a rather large volume by Hansel.[3] The author was one of the first otolaryngologists to investigate nasal allergy other than hay fever. He goes into considerable detail regarding allergic theory and practice, and particularly on eosinophile counts with which he is most familiar. The book should be welcomed by those otolaryngologists who have neglected the rôle of allergy or considered it from the limited field of their specialty.

The third edition of Bray's[4] book *Recent Advances in Allergy* is considerably enlarged by additional data. The discussions seem helpful, and the ample bibliography does not leave the reader with only the author's interpretations. The book should continue in popularity with the medical profession and its students.

In the realm of theory, an interesting report is the study of Wiener, Zieve, and Fries[5] on the inheritance of allergic disease. They postulate a single pair of allelomorphic genes "H" and "h," which make for three possible geno-types: (HH) allergy free, (hh) allergy of intensified severity before puberty, and the third, (Hh) allergy transmitting and/or allergy as a latent characteristic after puberty. They do not explain the male predominance in the group developing allergy before puberty in their series. The same workers studied the possible linkage of allergy genes with those determining blood groups, eye color, and agglutinogen types but found no correlation for, or evidence of, such linkage.[6]

In a similar study, Harley[7] attempted to find a correlation, if any, in the frequency of Landsteiner and Levine[8] agglutinins in 200 allergic individuals. However, the distribution was not altered from that found

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in the general population. A less scientific study of conditions correlated with allergy is the report of MacInnis,[9] who found only five patients with allergic symptoms in a total of 7,000 inmates of state hospitals. He suggests that the allergic symptoms vary with the mental balance, being aggravated in normal or mental health. His method and interpretation are not above criticism. In the past there have been observations tending to show a higher intelligence quotient in allergic children.[10] Recently Piness, Miller and Sullivan[11] reported standard psychologic tests on their patients at the Los Angeles Children's Hospital Clinic. The intellectual level was found not to be materially different from that of children in the general population.

In contrast with these studies, Vaughan's[12] study suggests that the mechanism of the allergic response is essentially purposeful and protective. He contends all individuals are potentially allergic and differ only in degree of manifestation. Vaughan feels that the presenting symptoms are significant of the attempt of the body to throw off or neutralize offending irritants. As such the mechanism is somewhat parallel to that of the immune mechanism. Borrowing a term from psychiatry, he feels that the allergic individual lacks integration in the mechanism and is then in a state of "environmental maladjustment." Vaughan's thesis is easily traced through his reports of the past years which particularly emphasized the minor allergies. One is tempted to paraphrase the story of the Quaker, "Everybody is allergic but me and thee, and sometimes even thou art a little allergic."

MacQuiddy, McIntyre, and Koser[13] studied the blood sugar and its response to ingestion of dextrose in a group of patients with hay fever and asthma. They found no significant difference between the response from the normal or control group and from their allergic patients. Another search for constitutional or metabolic characteristics in the allergic patient was that of Loveless,[14] who made a most thorough study of gastric acidity in 132 patients with allergy. She found no correlation between allergy and low gastric acidity. There was wide deviation from average gastric acidity determinations in the children in her group and little to warrant acid therapy. This thesis regarding hypochlorhydria and allergy has been mentioned in most of the recent reviews, and it strikes the reviewer as being an exhausted, sufficiently disproved, suggestion. It is true that the proper gastric acidity reduces absorption from the gastric mucosa and as such, acid may be used empirically with certain food allergens. It is unwarranted to assume a low gastric acidity as characteristic of allergic individuals, particularly children, when a host of studies already points to the wide fluctuations in normal children.

In a group of pollen-sensitive patients, Hathaway and his coworkers[15] made analyses of calcium and phosphorus and found no significant alterations in the blood calcium and phosphorus; they believe vitamin D as viosterol is of value. This, of course, is based on (empirical) clinical observations and might better have been reported as a separate study. They advise massive doses (4,000 units per kilogram of body weight) in combination with pollen extract injections. Although they warn against such large doses of viosterol for patients with renal disease, the reviewer feels the practice may be dangerous in other conditions. Patent vitamin D preparations are still so new that caution should be exercised before advising massive therapy. While instances of hypervitaminosis

are rare, dosage may depend on the age of the recipient's skeleton and blood vessels which, together with the possibility of toxic fractions in viosterol, should limit the use of large doses.

Black and Braden[16] attempted to explain the daily variations in blood concentration and blood chlorides which have been previously reported by Barber and Oriel.[17] They suggest that humidity and barometric pressure influence blood concentration. This may alter the peripheral-splanchnic balance discussed in the 1933 review. The rôle of digestion complicates the explanation of the wide variation in blood chlorides in normal individuals.

Last year's review discussed studies on blood fats in eczema.[18] Stoesser,[19] also of the Minnesota group, now reports a lowering of the cholesterol fraction in infection which is of less magnitude in those infants with eczema. With somewhat different methods from those of Hansen and Stoesser, the German workers, Freudenberg and Schornstein,[20] attempted to establish the curve of blood fat following ingestion of fatty foods, a parallel to the accepted blood sugar curve. However, they found the variations in serum fat too great to admit of interpretation. They did find that the serum fat tended to be elevated during the first year of life though the elevation was less in eczematous infants. In contrast with the Minnesota group, who recommend the use of linseed oil as a therapeutic measure, the German workers advise a fat poor diet for both seborrheic dermatitis and eczema. As for the lipids of the blood in hay fever and asthma, Bullen and Bloor[21] could find no evidence of alteration of the unsaturated fatty acids.

Hooker's discussion[22] of antigens, his presidential address to the Society for the Study of Asthma and Allied Conditions, was of considerable theoretical merit. From Well's hypothesis that antigenic determinants may not be dependent on the entire protein molecule but upon certain groups or radicles within it, Hooker reviewed more recent developments which explain the production of multiple antibodies from a single antigen. Within larger molecules submolecular (hapten) groups may be responsible, somewhat akin to the chemotherapeutic responses to radicles within the molecule of a certain drug.

It will be recalled that staphylotoxin has been shown to increase hypersensitivity to foreign proteins in experimental animals. Swift and Shultz[23] have extended the study to streptococci during the past year and find that, combined with beef lens protein, this bacterium acts synergistically whether incubated with the foreign protein or injected separately in the same area. This stimulating effect of streptococcus was not as marked, however, as was that found with staphylococcus.

Caulfeild and his coworkers[24] have likewise continued the suggestion in Harrison's work[25] with the combination of antigen and alum. These workers report that alum used with ragweed pollen acts as an adjuvant to increase the sensitization of guinea pigs to the pollen. Hence alum may be said to react with both "an antigen to produce immunity or with an antigenic to increase sensitivity or to induce in an animal any anaphylactic state." The implication of the relation between the allergic mechanism and immunity is obvious.

Guinea pigs were also used by Kile[26] to obtain sensitization to plant oils. By a method similar to that used to produce ragweed dermatitis in these animals (compare last year's review),[27] he was able to sensitize to poison ivy. Rabbits could not be sensitized to poison ivy, nor could this worker obtain sensitization of guinea pigs to orris root.

Campbell and his fellow-workers[28] used guinea pigs to study allergic inflammation. They found that eosinophilia was not always associated with this type of inflammation and that there was no apparent protection from preexisting eosinophilia.

The skin test has been subject to further study in the past year. Menkin[29] questions the histamine hypothesis and Lewis' theory with regard to wheal formation. He considers injury of any cells, rather than injury to cells limited to the capillary wall. He produced an inflammatory exudate in the pleural cavities of the experimental dogs and found that the action of this "product of cell injury" would increase capillary permeability as tested by dyes, but tested on smooth muscle strips it would produce, in contrast to histamine, a relaxation, not a contraction. It should be noted, however, that Lewis was careful to call his fraction "histamine-like" and avoided the statement that the substance "X" was identical with histamine. The reviewer feels that too frequently Lewis[30] has been misinterpreted. This applies not only to the use of histamine therapeutically but also to studies based on the identity of the "X" substance suggested by his studies with histamine.

Continuing the suggestions of Spain and Newell,[31] Parlatto[32] has reported further observations on the study of fluid produced in blisters from cantharides or cautery. Parlatto found skin sensitizing antibodies present and obtained passive transfer of the skin test in some instances. Wagner and Rackemann[33] report observations of the effect on the skin test of repeated local injections in patients with hay fever. A relative reduction in the reactivity at the site was obtained. This desensitization was relative since the skin test response could be obtained with stronger testing solutions or if treatment were discontinued for short intervals. Some crossed reactions were found with timothy, orchard grass, and red top pollens, but this was not universal, varied with the recipients, and hence raised the question of multiple antigens. Hourly injections of the same site reduced the reactivity, which fact parallels Alexander's work[34] on horse serum sensitivity and the usual program of desensitization for the use of antitoxins in the serum sensitive patient. As for the implied program of coseasonal treatment of hay fever, more will be said later.

Baldwin and Benedict[35] have applied the method of exhaustion of passive transfer sites to the study of group relations within food allergens. Their results would tend to show a relationship of botanically related foods (as suggested earlier by Vaughan[36]) and the desirability of purification of testing materials rather than skepticism regarding the significance of skin tests to food.

Intracutaneous injections of bacterial nucleoproteins was the subject of a report by Stevens and Jordani.[37] The extracts were obtained from pathogenic organisms of the upper respiratory tract in asthmatic patients. They observed both immediate and delayed reactions although rarely at the same site. These reactions were far from constant, changing with time, and occurring with the same appearance and variation in allergic and nonallergic individuals. It may be recalled that the reviewer has had considerable pessimism with regard to the interpretation of skin tests in the search for the basis of the assumed bacterial allergy.

Tuft and Brodsky[38] have recently studied the effect of various drugs upon allergic reactions. They found that epinephrine (adrenalin) or its combinations reduced the skin reactivity. The effect was transitory. They suggest that the therapeutic effect of a drug might be gauged by its effect on the skin test. With such a gauge, calcium and iodine are

without value, pituitrin and aminophyllin warrant further clinical trial. The reviewer believes that in some individuals the effect of ephedrine may be much longer than that observed by Tuft for epinephrine, and that more reliable skin tests may be obtained if the interval following the use of ephedrine, and before skin testing, is longer than that suggested by this work.

Turning next to consideration of antigens themselves, Garvin and Kurland[39] report experiments showing that pollen extracts do not contain heterophile antigen. Hence heterophile antibody formation is not involved in pollen injection treatments. The authors estimated the antibody titer in the blood of six patients with hay fever and found no increase after pollen injection. The same result was found in the serum titer of rabbits injected intravenously with pollen extracts.

Hecht, Rappaport, and Briggs[40] report the satisfactory use of merthiolate as a preservative for protein solutions used in the testing and treatment of allergic conditions. They find this substance an effective, nonirritating, bactericidal agent. A more stable vehicle for pollens is found to be buffered dextrose solution, according to Unger and Moore.[41] Pollen extracts in this medium are not altered in potency.

Kapok has been subjected to a study somewhat similar to that reported last year on cotton. The new study by Wagner and Rackemann[42] confirms the striking effect of aging as shown by the difference between new and used kapok. Extracted by various technics, the active principle is apparently of small molecular size and contains nonprotein nitrogen and carbohydrate fractions. The authors did not obtain passive transfer tests or guinea pig anaphylaxis with the essential fraction. Fungi and molds have continued to attract study. A rather extensive report by Brown[43] reviews the development of our knowledge concerning molds. It seems strange that in his discussion of work already reported, no mention is made of Feinberg and Little's studies.[44] Brown considers the fungi of equal importance with epidermals, pollens, and foods. Their principal source is in dust. Conant, Wagner, and Rackemann[45] report studies of molds found in pillows, mattresses, and furniture. Although there was considerable variety in the type of mold found in these different articles, there seemed to be some characteristic mold for the individual household. Kapok was found to be the most heavily laden vehicle for molds. Lamson and Rogers[46] have analyzed, in 1,259 patients, the significance of the incidence of positive skin tests to molds. They found 154 reactors in the group tested with extracts of nine different molds. Although the incidence of true allergic conditions was rather high in the population he studied (15.5 per cent), only 13 per cent were mold sensitive, and of the positive reactors to molds 13.6 per cent reacted to no stock allergen. No common factor was noted for four species of Aspergillus. Sex was not a factor in mold sensitivity, but there did seem to be a definite relationship to age, reactions being more frequent in those individuals under forty years of age. The authors discuss the probable frequency in a total population with a higher incidence in children and the probable effect of climate. Their work was done in the desert district.

Trichophyton sensitivity was investigated by Sulzberger, Lewis, and Wise.[47] Since Jadassohn and his coworkers[48] had reported a common excitant, and species specific excitant in trichophyton, epidermophyton, and achorian, the New York workers compared the trichophyton and Brazilian dermatomycol for similar excitants. The latter product gave

positive cutaneous tests of the tuberculin type in over 39 per cent of the patients sensitive to ordinary trichophytons. Although an occasional strong reaction was obtained, the responses were usually less strong than those to ordinary trichophyton solutions (1:30 Lederle, 1:100 Metz).

Clinical skin manifestations of allergy have received a great deal of attention in the past year. Stimulated, perhaps, by the work of Schwartz and Peck[49] on irritants in adhesive plaster, Grolnick[50] reports clinical and immunologic observations on adhesive plaster dermatitis. He does not find the condition associated with an allergic family history, previous use of adhesive plaster, dermographism, or skin type. Young adults are most frequently affected (although perhaps this age is more prone to use adhesive plaster). Two types are manifest, the first in individuals with other types of contact dermatitis; the second a nonspecific condition of shorter duration. The reviewer has often wondered if intensive study of the patch test would not show that as an allergy of lesser degree, direct tests would be obtained or be interpretable if read at twenty-four or forty-eight hours, i.e., as suggested by the work of Simon and Rackemann[51] on the development of the skin test, there being first a delayed response then an increased intensity with disappearance in the reverse order. If such were the case, the nonspecific type of reaction considered by Grolnick could be ascribed to essential skin irritants as is found in response to mustard.

However, in this regard, the suggestions of Obermayer, and his coworkers[52] are interesting. To them, the scratch test concerns the upper vascular layer of the skin and hence tests capillary sensitivity. Their entire report on epidermal and dermal hypersensitivity in patients with functional dermatoses offers a challenge to many of the contentions of allergists. They consider the patch test of value only in eczema of the dermatitis venenata type and of no value in neurodermatoses. They deny the rôle of sensitivity in infantile eczema in which instance positive scratch tests are considered of no significance as polysensitivity is the rule. In the case of dry neurodermatitis, they admit a frequent association with hay fever and positive scratch test to ragweed, but deny the significance of positive tests in either dry or wet neurodermatitis or the benefit from graded injection or from the removal of suspected irritants of the accepted allergic type. So we are thrust back to the theory of "protoplasmic instability." While such a report is healthy in view of the overstatements of enthusiastic allergists, there is much to warrant discussion. In the first place, to base their statements concerning infantile eczema on only four such patients is unwarranted. Second, to expect an exact correlation of skin tests and clinical picture shows a lack of familiarity with the tests and an expected accuracy greater than that usually found in tests of clinical merit. Finally, with such interesting phenomena as passive transfer for corroborative evidence of their significance, skin tests cannot be summarily dismissed as of academic interest only.

To some of us, not primarily interested in the appearance or description of dermatologic conditions, the report by Miescher[53] is welcome. Using various skin irritants, he finds that the spongiotic vesicle is not pathognomonic of allergic eczema. Hence it may be unwise to assume too strict a classification by histologic method whether in allergic eczema or the neurodermatoses of Obermayer and his coworkers.

Bonnevie and Genner[54] reported 15 cases of eczema caused by dyed clothing. There were no children in their group of patients. Some of

the patients were sensitive to dyes per se; one patient was sensitive to the tar of both wood and coal. An instance of dermatitis in a celery worker was reported by Gelfand.[55] Intradermal and patch skin tests of water extract of celery were negative but an ethyl-ether extract gave positive reactions by patch test. The incriminating principle apparently was of a volatile oil type resembling the active component in Rhus. Graded injections of the celery extract were beneficial. The condition is another instance of occupational dermatitis. As regards Rhus dermatitis, the program of graded injection has two recent corroborative reports. Blank and Coca,[56] using as patients recruits in a C.C.C. camp, divided 130 individuals into three groups. The first group (45) received injections of a strong extract and only nine developed poison oak after prophylaxis; the second group (40) received a weaker solution of the extract; three developed the disease whereas there were 30 who developed the disease in the control group (45) who received almond oil and acetone with no poison oak extract. A somewhat similar experience is reported by Molitch and Poliakoff[57] in the prophylaxis of poison ivy dermatitis in children. Forty boys in their series received graded weekly injections of the extract, as suggested by Spain and Cooke,[58] and were "immunized." A control group of 53 boys contracted the disease. Both groups gave positive patch tests.

Graham and Traub[59] report 30 case studies of allergic bacterial dermatoses. With vaccines of 20 different cultures of streptococci obtained from various foci, twelve patients gave reactions and were given the vaccine and five showed improvement. They believe the use of autogenous vaccines is valuable. However, this report is less scientific than that reported by Stevens and Jordani[60] and the likelihood of nonspecific effects of the vaccine must be considered. An instance of dermatitis caused by arsenic in hair tonic is reported by Gelfand.[61] He presents a review of the literature and a description of his patient's skin reactions. Patch tests with the hair tonic (Liquid Arvon) and with liquor potassii arsenatis were positive. On other rarer sensitizations with skin manifestations the report of Benson[62] is valuable. This investigator hatched and raised mosquitoes. Extracts of the bodies of these insects were made with buffered saline or concentrated by ammonium sulphate. Positive scratch tests were obtained. Graded injection reduced the symptoms of sensitivity.

On the general subject of clinical supervision of infantile eczemas, Sezary[63] disputes the rôle of sensitization and advises consideration of microbic activity associated with lack of cleanliness and care. He uses a wide variety of chemicals and nonspecific agents such as splenic extract and maternal blood. He admits the frequency of asthma and hay fever in the older children with eczema but adheres to his microbic theory, shock treatment, and climatic factors.

Marquardt[64] believes that the vegetative nervous system symptoms in hypersensitivity diseases of the skin are consequences of the sensitivity and without relation to the cause of the hypersensitivity. Using the classical drugs, epinephrine, atropine and pilocarpine, he studied the reactions before and after sensitization to paraphenylendiamine. The dominance of the parasympathetic over the sympathetic system is a natural individual state uninfluenced by sensitization.

The possible rôle of hypovitaminosis in eczematoid dermatitis is suggested by the report of White.[65] With the recent widespread interest in

accessory food factors, it is to be regretted that accurate measurements or estimations are not available. Methods for vitamin C and D determination are fairly reliable, and the indirect measure of vitamin A deficiency by the biophotometer might clarify our clinical impressions regarding hypovitaminosis. In this connection it is interesting to recall the report of Hoffman and Ratner[66] of infantile eczema caused by cod liver oil. The patient was fish sensitive.

A general discussion of the hay fever problem is given by Rosendahl and Dahl.[67] These Minnesota workers review the causes, diagnosis, and treatment of the condition and call attention to the fact that surveys in their district incriminate pollens of the chenopod, mugwort, wormwood, and carpet sage, in addition to ragweed. Ellis,[68] also from Minnesota, believes specific treatment of hay fever should be based on the local flora and the individual patient. His best results were correlated more closely with the maximum dose than with the number of injections or duration of treatment.

The controversy regarding the relative merits of seasonal and perennial treatment continues. Peshkin,[69] with a group of 60 adults and 40 children, compares the results of preseasonal treatment of three years' average duration with the results of perennial treatment of two years' average duration. In his experience failures were appreciably more frequent with the perennial treatment than with treatment given preseasonally. Children required as large doses as adults but relatively less on perennial treatment than on preseasonal treatment. Vander Veer,[70] in a more concise discussion, emphasized the likelihood of constitutional reactions when perennial treatment is used. He also suggests that the perennial treatment may be more satisfactory where the injection is limited to the extract of a single pollen rather than a variety of pollens.

Levin[71] also made observations on the controversial subject of the skin test following injection of pollen extracts. Earlier in the review Wagner and Rackemann's[72] detailed study was discussed. Levin's report is less scientific and more clinical in its nature. Although in agreement with Rackemann, he finds that large treatment doses reduce the scratch test response and obliterate it in 14.9 per cent of his cases. He believes the reduction in skin test parallels the clinical improvement. With a group of 98 pollen sensitive patients, Baldwin and Glaser[73] found the skin test response reduced in about one-half of the group after treatment. However, there was not correlation between alteration of the skin test and the clinical improvement. Mucous membrane sensitivity was a better gauge of therapeutic success but was not parallel with skin response.

Roentgen ray therapy for hay fever is among the novelties of treatment reported in the past year. Hatchette[74] treated 16 patients, 12 of whom had satisfactory improvement. End-results of perennial or preseasonal treatment with the versatile x-ray treatment were not given. The same may be said for the treatment of severe asthma by roentgen ray as suggested in the report of Maytum and Leddy.[75] The reviewer is not impressed.

A general discussion of asthma in children is given by Rudolph.[76] The author briefly discusses the methods of diagnosis and treatment by the (accepted) orthodox manner. Weille[77] reported a survey of 500 asthmatic patients of whom 362 had sinusitis. Despite the presence of foci of infection, 290 patients who received only medical treatment had improvement as satisfactory as that of those who received surgical treat-

ment. Similar conservatism regarding surgery is shown in the report by Mullin[78] on the surgical indications in disease of the nasal sinuses caused by allergy.

Kahn[79] reported 16 instances of asthma resistant to the usual treatments. Some were relieved by intravenous injection of epinephrine, and some by narcosis induced by ether oil given rectally.

A detailed report of an adult asthmatic patient was made by Rackemann and Theiler.[80] The rôles of respiratory infections, nervous factors, and coincidental drug sensitivity illustrate the difficulty in generalizations concerning treatment programs. However, adherence of three years to the allergy program resulted in most gratifying results.

In contrast, might be mentioned the program of Anderson[81] who believes that intratracheal injection of iodized oil is of value in treating bronchial asthma. As preparation for the intratracheal injection he used 2 per cent nupercaine spray. He offers no series with the nupercaine alone nor does he discuss any scientific basis for the value of iodized oil. Believing that there is as yet no substitute for sleuth work and individualization in the treatment of asthma, the reviewer, were he asthmatic, would prefer to take his chances with Rackemann.

The English workers, Costello and Fox,[82] report an instance of asthma and epilepsy appearing in a child of ten years whose family history gave no background of allergic phenomena. The conditions disappeared simultaneously. Without accepting too readily the thesis of allergy as a cause of epilepsy, the authors suggest anoxemia accompanying the asthma as a basis for the convulsions which invariably followed the asthma. Asthma related to sensitivity to chromates adds another occupational disease to the growing list. The patient described by Card[83] was a young adult female who worked in a chrome plating factory. Asthmatic attacks could be produced by injection of potassium dichromate. With discontinuance of her work her attacks stopped but recurred when she again returned to the factory. A change in occupation was necessary for complete relief. More bizarre is the allergy due to the menotoxin of pregnancy reported by Perlstein and Matheson.[84] The patient was a four-and-one-half-year-old negro girl who, following the mother's subsequent pregnancy, gave symptoms referable to the maternal periodic leucorrhea. Extracts gave positive skin reactions.

Asthma associated with sensitivity to taka diastase was described by Leopold.[85] His patient, a druggist, developed violent symptoms while compounding a prescription containing taka diastase. Positive skin tests were obtained to this substance and to Aspergilli and Penicillia.

Pratt[86] found hypersensitivity to dust in 79 per cent of his children between the ages of one and twelve years, suffering with perennial asthma. Intracutaneous tests and passive transfer supported his thesis. He believes the importance of house dust as an allergen increases with the advance in age.

Clein[87] believes that a great many chronic coughs and colds in children are related to allergy. Citing case illustrations he finds considerable justification for his allergy program. The coincidence of allergic diseases and tuberculosis is reported by Wilson[88] in his survey of 321 patients in the Southern Pacific Sanitarium. He found 19 with allergic manifestations and believes that treatment, as for example injection of pollen extract for hay fever, is necessary and without harm to the tuberculosis.

Simon and Ryder[89] describe five instances of hypersensitivity to pituitary extracts which they have seen in the past two years at the Louisville City Hospital. The symptoms varied from urticaria to respiratory difficulty and were relieved by epinephrine. Skin tests were positive to a variety of pituitary derivatives and passive transfer was obtained in two studies. The condition probably will be found more frequently if pituitary products find an increased use in clinical medicine. Here should be mentioned the report by Wilmer and Miller[90] on the use of adrenal cortical hormone in the treatment of allergic manifestations. In a group of 72 patients, 90 per cent of whom were refractory to other methods of treatment, 42 per cent showed improvement following the use of cortical extract. Sugar tolerance and blood pressure were not altered. In view of these findings it is difficult to ignore the possible nonspecific effect. It will be recalled that Cohen's work[91] on adrenal factors in allergy, reported in the two preceding reviews, failed to reveal any superior indications of adrenal imbalance despite theoretical implications to the contrary. Hence it would seem unwise to liberalize the use of endocrine products with the danger of secondary sensitivity to those products unless more specific indications are found.

Calcium as a therapeutic agent in allergic conditions is again championed. Rudolph[92] believes dicalcium phosphate was of benefit in 36 patients, when used for indefinite periods of time. In view of the lack of scientific basis, this therapy must be considered artistry in treatment especially where other specific programs are used simultaneously.

Ionization treatment in nasal allergy has an effect similar to that of escharotics, according to Bernheimer.[93] The author feels that complications may follow ionization which do not characterize the aftermath of escharotics. The report by Dean[94] on "iontophoresis" in the treatment of nasal allergy will be, the reviewer hopes, a fitting obituary for this novelty in treatment. Taub[95] described local allergy of the eye in a patient having chronic conjunctivitis caused by silk.

Horton, Brown, and Roth,[96] the Mayo Clinic workers, who have reported previously on allergy to cold, have recently brought the entire subject up to date with a review of the 76 reported instances. In their clinic 22 of these patients have been observed. They again emphasize the similarity to histamine reactions as probable support for the histamine-injection therapy advised previously by them.

Allergic abdominal pain in children, which has been mentioned in previous reviews, is the subject of a report by Fries and Merrill.[97] They discuss the historical background of the present concept. Save for the use of trial diets, the usual allergy diagnostic methods are not satisfactory. They assume three types of reaction varying with intensity of the symptoms. A variety of therapeutic measures, besides dietary elimination, are suggested.

Although there have been isolated reports of thrombocytopenic purpura associated with certain drug hypersensitivities, it has been assumed that the purpura of food allergy (Henoch's type) is of the nonthrombocytopenic type. Diamond[98] feels that purpura may occur as a manifestation independent of joint or abdominal symptoms. He reports a group of nine children with purpuric manifestations following ingestion of food. Platelet counts were reported in only two of his patients, and they were not reduced. Squier and Madison[99] recently reported thrombocytopenic purpura in patients with food allergy. It is too early

to assume allergy as the cause of thrombocytopenia, and, although we are at present skeptical as to the correlation of platelet counts and purpura, the report warrants further investigation.

Regarding the significance of positive skin tests to tobacco in thromboangiitis obliterans, the reports of the past year show considerable skepticism on the work of Harkavy.[100] Maddock, Malcolm, and Coller,[101] reporting from the University of Michigan on vascular and thermal studies, feel that it is not necessary to consider allergy in order to interpret the aggravating action of tobacco in thromboangiitis obliterans. The vasospasm, they believe, is more directly drug action than that of allergic sensitization. Another group of observers, Trasoff, Blumstein, and Marks,[102] come to almost similar conclusions. They believe the action of tobacco is pharmocologic, but the patients with thromboangiitis are a most susceptible constitutional type. They believe the high incidence of positive skin tests found in these patients is misleading and that tobacco allergy is found in less than 1 per cent. Conversely, thromboangiitis obliterans is not common in the groups of patients presenting obvious allergic responses.

Waldbott[103] has made further pathology studies, comparing the changes found at postmortem examination of infantile asthma with asthma of long duration. He believes the infantile (fresh) asthma shows more suggestion of anaphylactic shock.

There have been, in the past year, many helpful articles dealing with the general management of allergy. Swineford,[104] discussing the proper method of history taking, emphasizes the necessity of careful detail comparable with that which psychiatrists use. McGee[105] emphasizes the personal history with its habits and hobbies. He calls attention to the frequency with which nasal allergy may be overlooked especially if no seasonal variation in symptoms is given. The importance of pollens and powders in urticaria is mentioned. For injection therapy he advises dosage on the individual case basis and a course of pollen injections not shorter than three years. Migraine, he believes, may not necessarily be allergic—a wise opinion in view of its riddlesome nature.

Adams[106] reviews the diagnostic methods, history, environment, and skin tests. In treatment he finds mixed respiratory vaccines of value, but does not discuss the specific or nonspecific nature of such treatment. More in the spirit of the times is the report of Glaser and Landau[107] on the prophylaxis of allergic disease. It is to be regretted that Vaughan's opinion[108] (with his new theory regarding allergy) cannot be quoted at this point in the discussion. The reviewer believes the article is timely but, though recognizing the heredity factor in allergy, doubts if we are on firm enough footing to advise or condemn parenthood on this basis. The avoidance of certain articles in the diet of the expectant mother also is controversial. The reviewer does believe, however, that in the probable allergic infant, dietary supervision and eternal vigilance over the environment is desirable. The tendency to introduce solid foods at an early age certainly will add difficulty and confusion to the care of an allergic infant. Credelle's emphasis[109] on rest as an adjunct to the management of allergic disease is timely. This important measure is too often overlooked or neglected, especially for the high-strung, poorly nourished, allergic child.

In concluding his fifth yearly review on allergic diseases, the writer believes a change of reviewer would prove freshening and beneficial. It is impossible to refrain from expressing generalities regarding some of

the tendencies in the current literature. The eagerness with which allergy is suggested as a basis for obscure diseases would surely draw a word of caution from its progenitors. A predominance of clinical reports seems to persist when the crying need is for more fundamental studies. As a result, repetition of clinical phenomena is the rule and conclusions become rather hackneyed. Nor is the reviewer impressed with the current tendency to apply the statistical method to clinical groups. The populations are too small and lack uniformity. More detailed studies of small groups or of individuals—accurate life histories from infancy to adult life—would be of value.

REFERENCES

1. Durham, O. C.: Your Hay Fever, Indianapolis, 1936, Bobbs.
2. Allergic Diseases: Critical Review, J. PEDIAT. 8: 500, 1936. Reference 2.
3. Hansel, F. K.: Allergy of the Nose and Paranasal Sinuses, St. Louis, 1936, The C. V. Mosby Company.
4. Bray, G. W.: Recent Advances in Allergy, ed. 3, Philadelphia, 1937, Blakiston's Son & Co.
5. Wiener, A. S., Zieve, M. A., and Fries, J. H.: Ann. Eugenics 7: 141, 1936.
6. Wiener, A. S., Zieve, M. A., and Fries, J. H.: Ann. Eugenics 7: 163, 1936.
7. Harley, D.: Brit. J. Exper. Path. 17: 143, 1936.
8. Landsteiner, K., and Levine, P.: J. Immunol. 20: 179, 1931.
9. MacInnis, K. B.: J. Allergy 8: 73, 1936.
10. Balyeat, R. M.: Am. J. Dis. Child. 37: 1193, 1929.
11. Piness, G., Miller, H., and Sullivan, E. B.: J. Allergy 8: 168, 1937.
12. Vaughan, W. T.: J. Lab. & Clin. Med. 21: 629, 1936.
13. MacQuiddy, E. L., McIntyre, A. R., and Koser, D.: J. Allergy 7: 471, 1936.
14. Loveless, M.: J. Allergy 7: 203, 1936.
15. Hathaway, M. L., Rappaport, B. Z., Reed, C. I., and Struck, H. C.: J. Allergy 8: 1, 1936.
16. Black, J. H., and Braden, A. H.: J. Allergy 8: 39, 1936.
17. Barber, H. W., and Oriel, G. H.: Brit. J. Med. 2: 880, 1928.
18. Allergic Diseases: Critical Review, J. PEDIAT. 8: 500, 1936. Reference 77.
19. Stoesser, A. V.: Proc. Soc. Exper. Biol. & Med. 32: 326, 1936.
20. Freudenberg, E., and Schornstein, L.: Ztschr. f. Kinderh. 57: 675, 1936.
21. Bullen, S. S., and Bloor, W. R.: J. Allergy 8: 155, 1937.
22. Hooker, S. B.: J. Allergy 8: 113, 1937.
23. Swift, H. F., and Schultz, M. P.: J. Exper. Med. 63: 725, 1936.
24. Caulfeild, A. H. W., Brown, M. H., and Waters, E. T.: J. Allergy 7: 451, 1936.
25. Harrison, W. T.: Pub. Health Rep. 49: 462, 1936.
26. Kile, R. L.: Arch. Dermat. & Syph. 34: 90, 1936.
27. Allergic Diseases: Critical Review, J. PEDIAT. 8: 500, 1936. Reference 7.
28. Campbell, A. C. P., Drennan, A. M., and Rettie, T.: J. Path. & Bact. 40: 537, 1935.
29. Menkin, V.: J. Exper. Med. 64: 485, 1936.
30. Lewis, T.: The Blood Vessels of the Human Skin and Their Responses, London, 1927, Shaw.
31. Allergic Diseases: Critical Review, J. PEDIAT. 6: 555, 1935. Reference 68.
32. Parlatto, S. J.: J. PEDIAT. 7: 573, 1936.
33. Wagner, H. C., and Rackemann, F. M.: J. Allergy 7: 543, 1936.
34. Alexander, H. L.: Arch. Int. Med. 20: 636, 1917.
35. Baldwin, H. S., and Benedict, M. I.: J. Allergy 8: 120, 1937.
36. Allergic Diseases: Critical Review, J. PEDIAT. 2: 349, 1933. Reference 199.
37. Stevens, F. A., and Jordani, L.: J. Allergy 7: 443, 1936.
38. Tuft, L., and Brodsky, M. L.: J. Allergy 7: 238, 1936.
39. Garvin, P. D., and Kurland, S. K.: J. Allergy 7: 475, 1936.
40. Hecht, R., Rappaport, B. Z., and Briggs, F.: J. Allergy 7: 261, 1936.
41. Unger, L., and Moore, M. B., J. Allergy 8: 22, 1936.
42. Wagner, H. C., and Rackemann, F. M.: J. Allergy 7: 224, 1936.
43. Brown, G. T.: J. Allergy 7: 455, 1936.
44. Allergic Diseases: Critical Review, J. PEDIAT. 8: 500, 1936. Reference 38.
45. Conant, N. F., Wagner, H. C., and Rackemann, F. M.: J. Allergy 7: 234, 1936.
46. Lamson, R. W., and Rogers, E. L.: J. Allergy 7: 582, 1936.

47. Sulzberger, M. B., Lewis, G. M., and Wise, F.: Arch. Dermat. & Syph. **34**: 207, 1936.
48. Jadassohn, W., Schaaf, F., and Laetsch, W.: Arch. f. Dermat. u. Syph. **171**: 461, 1935.
49. Schwartz, L., and Peck, S. M.: Public Health Rep. **50**: 811, 1935.
50. Grolnick, M.: J. Allergy **7**: 556, 1936.
51. Allergic Diseases: Critical Review, J. PEDIAT. **6**: 555, 1935. Reference 19.
52. Obermayer, M. E., Becker, S. W., Praver, L. L., Shaw, C., and Becker, F.: Arch. Dermat. & Syph. **34**: 411, 1936.
53. Miescher, G.: Arch. f. Dermat. u. Syph. **173**: 117, 1935.
54. Bonnevie, P., and Genner, V.: Arch. Dermat. & Syph. **34**: 220, 1936.
55. Gelfand, H. H.: J. Allergy **7**: 590, 1936.
56. Blank, J. M., and Coca, A. F.: J. Allergy **7**: 552, 1936.
57. Molitch, M., and Poliakoff, S.: Arch. Dermat. & Syph. **33**: 725, 1936.
58. Spain, W. C., and Cooke, R. A.: J. Immunol. **13**: 93, 1927.
59. Graham, T. N., and Traub, E. F.: Arch. Dermat. & Syph. **34**: 484, 1936.
60. Stevens, F. A., and Jordani, L.: See reference 37.
61. Gelfand, H. H.: J. Allergy **7**: 254, 1936.
62. Benson, R. L.: J. Allergy **8**: 47, 1936.
63. Sezary, A.: Presse med. **43**: 2059, 1935.
64. Marquardt, F.: Dermat. Wchnschr. **100**: 409, 1935.
65. White, C.: J. Allergy **8**: 71, 1936.
66. Hoffman, S. J., and Ratner, H.: J. A. M. A. **107**: 494, 1936.
67. Rosendahl, C. O., and Dahl, A. O.: Minnesota Med. **19**: 505, 1936.
68. Ellis, R. V.: Minnesota Med. **19**: 507, 1936.
69. Peshkin, M. M.: J. Allergy **7**: 477, 1936.
70. Vander Veer, A.: J. Allergy **6**: 578, 1936.
71. Levin, S. J.: J. Allergy **8**: 26, 1936.
72. Wagner, H. C., and Rackemann, F. M.: See reference 33.
73. Baldwin, L. B., and Glaser, J.: J. Allergy **8**: 129, 1937.
74. Hatchette, S.: New Orleans M. & S. J. **89**: 70, 1936.
75. Maytum, C. K., and Leddy, E. T.: J. Allergy **8**: 66, 1936.
76. Rudolph, J. A.: Ohio State M. J. **32**: 430, 1936.
77. Weille, F. L.: New England J. Med. **215**: 235, 1936.
78. Mullin, W. V.: S. Clin. N. Amer. **15**: 839, 1935.
79. Kahn, I. S.: J. Allergy **8**: 158, 1937.
80. Rackemann, F. M., and Theiler, H.: J. Allergy **7**: 523, 1936.
81. Anderson, W.: New York State J. Med. **36**: 1151, 1936.
82. Costello, K., and Fox, J. T.: Lancet **1**: 660, 1936.
83. Card, W. L.: Lancet **2**: 1348, 1935.
84. Perlstein, M. A., and Matheson, A.: Am. J. Dis. Child. **52**: 303, 1936.
85. Leopold, S. S.: J. Allergy **7**: 594, 1936.
86. Pratt, H. N.: J. Allergy **8**: 60, 1936.
87. Clein, N. W.: Northwest Med. **35**: 347, 1936.
88. Wilson, R. A.: Southwestern Med. **20**: 331, 1936.
89. Simon, F. M., and Ryder, C. F.: J. A. M. A. **106**: 512, 1936.
90. Wilmer, H. B., and Miller, M. M.: J. Allergy **8**: 77, 1936.
91. Allergic Diseases: Critical Review, J. PEDIAT. **6**: 555, 1935. Reference 13.
92. Rudolph, J. A.: M. Rec. **144**: 191, 1936.
93. Bernheimer, L. B.: J. A. M. A. **106**: 1980, 1936.
94. Dean, L. W.: Ann. Otol., Rhin. & Laryng. **45**: 326, 1936.
95. Taub, S. J.: J. Allergy **8**: 75, 1936.
96. Horton, B. T., Brown, G. E., and Roth, G. M.: J. A. M. A. **107**: 1263, 1936.
97. Fries, J. H., and Merrill, G. A.: Am. J. Dis. Child. **52**: 1107, 1936.
98. Diamond, J.: J. PEDIAT. **8**: 697, 1936.
99. Squier, T. L., and Madison, F. W.: J. Allergy **8**: 143, 1937.
100. Allergic Diseases: Critical Review, J. PEDIAT. **6**: 555, 1935. References 97, 98, and 99.
101. Maddock, W. G., Malcolm, R. L., Coller, F. A.: Am. Heart J. **12**: 46, 1936.
102. Trasoff, A., Blumstein, G., and Marks, M.: J. Allergy **7**: 250, 1936.
103. Waldbott, G. L.: J. Allergy **7**: 264, 1936.
104. Swineford, A.: Virginia M. Monthly **63**: 139, 1936.
105. McGee, W. A.: Virginia M. Monthly **63**: 219, 1936.
106. Adams, H. B.: J. PEDIAT. **8**: 544, 1936.
107. Glaser, J., and Landau, D. B.: J. PEDIAT. **8**: 470, 1936.
108. Vaughan, W. T.: See reference 12.
109. Credelle, B. A.: J. Allergy **8**: 71, 1936.

American Academy of Pediatrics

Proceedings

SEVENTH ANNUAL MEETING OF THE AMERICAN ACADEMY OF PEDIATRICS

WALDORF-ASTORIA HOTEL, NEW YORK
JUNE 3, 4, AND 5, 1937

Report of the Executive Board

As it is customary for the Vice-President (President-elect) to submit a report for the Executive Board, it devolves upon me to do so.

At the Executive Board meeting held at the Georgian Hotel, Evanston, Ill., Nov. 28, 1936, all the members of the Executive Board were present.

One hundred twenty-two members were elected to Fellowship. Dr. Maynard Ladd, of Boston, and Dr. Ann Martin, of Hayward, Calif., were appointed to Emeritus Fellowship. Dr. Carroll E. Palmer, of Washington, D. C., was elected to Associate Fellowship.

Many miscellaneous matters were taken up, the report of which appeared in THE JOURNAL OF PEDIATRICS. The most important of these, however, was the recommendation of Region III that a representative to the Executive Board meetings be selected by the state groups on recommendation of the regional chairman and appointed by the president. These recommendations were to be composed by Dr. Henry F. Helmholz and have been submitted to you.

The Council for Pediatric Research submitted several matters for discussion. These will be covered, I believe, in their report to the Academy at this meeting.

Philip Van Ingen
Vice-President

Report of the Secretary

There are now 1,138 Fellows in the Academy.

During the past year, the secretary is sorry to have to record the death of eleven of the Academy Fellows, namely:

Dr. N. N. Allen, Houston, Tex.
Dr. William L. Buhrman, Chicago, Ill.
Dr. Thos. DeWitt Gordon, Grand Rapids, Mich.
Dr. W. McKim Marriott, San Francisco, Calif.
Dr. Robert K. Rewalt, Williamsport, Pa.
Dr. Charles Schott, Chicago, Ill.
Dr. Arthur Stern, Elizabeth, N. J.
Dr. Donald K. Woods, San Diego, Calif.
Dr. Gustave Lippmann, St. Louis, Mo.
Dr. John Blair Spencer, Gloucester, Va.

Emeritus Fellow

Dr. LaFayette B. Mendel, New Haven, Conn.

Besides the annual meeting, there have been three regional meetings: Regions I and II meeting at Baltimore, November 16 and 17; Region III in Cincinnati, November 20 and 21; and Region IV in San Francisco, October 22-24. The secretary attended all of these meetings and can attest to the excellence of each.

During the past year, many of the special committees have been very active. Among these activities may be noted the work of the Committee on Cooperation with Nonmedical Groups and Societies. This committee arranged for a broadcast on the health of children in conjunction with the National Congress of Parents and Teachers. If the reports we have received of the way this broadcast was accepted may be credited, this has been an outstanding attainment.

The Committee on Hospitals and Dispensaries finished its report on contagious hospitals. The Committee on Medical Education has been reorganized under three headings: graduate education, undergraduate education and postgraduate education. The Committee on Mental Hygiene has been reorganized and is projecting a meeting with outstanding psychologists to iron out some of the controversial questions on the subjects of psychology and psychiatry in childhood.

The Committee on Nursing Education has been very active as you will see from the report which has been sent in and has offered us a program for nursing education in pediatrics which should be of much value.

The Committee on School Health and School Health Education has sent a questionnaire to all members which has brought good response and from which we may expect some definite recommendations.

Last, the Council on Pediatric Research has obtained a two-year grant from the Carnegie Foundation which will enable it to go ahead and perfect its plans of organization. Dr. Thomas B. Cooley, of Detroit, has been elected secretary of this group and will give practically all his time to the work.

At its meeting in Evanston, Nov. 28, 1936, the Executive Board approved of the suggestion of Dr. Helmholz for reorganizing of the regional committees. This proposition has been placed before you and will require a change in the By-Laws to meet the situation.

It is to be noted that the work of the various states as a result of the Social Security Act Funds for the prevention of infant mortality and the care of children has been widely seconded by members of the Academy working through various state medical societies. This work cannot be too highly praised.

It seems to the secretary that the Society is to be congratulated upon the character and variety of its activities and that it is assuming the position in American medicine which will be a credit to pediatrics.

Clifford G. Grulee
Secretary

Report of the Treasurer

STATEMENT OF RECEIPTS AND DISBURSEMENTS
June 1, 1936 to May 31, 1937

Balance, June 1, 1936		$ 5,132.86
Receipts:		
Dues	$21,255.20	
Initiation Fees	112.10	
Exhibits	3,330.00	
Interest on Bonds	412.50	
Miscellaneous	5.00	$25,114.80
		$30,247.66

Disbursements:

Transferred to Savings Account			$ 5,000.00
Office			
Salaries			
Secretary		$5,000.00	
Stenographer		1,730.00	
Office		385.00	$ 7,115.00
Printing and Stationery		596.35	
Rent		545.00	
Postage		549.67	
Traveling Expense		324.38	
Office Equipment and Supplies		218.24	
Exchange on Checks		51.66	
Telephone and Telegrams		8.89	
Express		6.32	
Tax on Checks		1.50	
Miscellaneous		100.65	$ 2,402.66
Subscriptions		5,402.50	
Executive Board		752.15	
Annual Meeting—1936	$400.05		
1937	322.58	722.63	
Certificates		80.40	$ 6,957.68
Regional Expense:			
Region I		25.00	
II		96.99	
I and II Meeting		130.37	
III		102.65	
IV		52.03	$ 407.04
State Expense:			
Region I			
New Jersey	$78.00		
Pennsylvania	13.00	$ 91.00	
Region II			
Alabama	24.00		
Florida	11.00		
Georgia—1936	40.04		
1937	31.00		
Mississippi	25.00		
North Carolina	19.00		
Tennessee	37.43		
Texas	74.00		
West Virginia	12.31	$ 273.78	
Region III			
Illinois	$186.18		
Michigan	50.00		
Ohio	6.00		
South Dakota	2.00		
Wisconsin	6.71	$ 250.89	
Region IV			
California	10.80		
Washington	11.90	$ 22.70	$ 638.37

Committees:			
Cooperation With Nonmedical Groups and Societies	576.59		
Pediatric Research	828.80		
($500.00 to be refunded to Academy)			
Child Health Relations	18.99		
School Health, and School Health Education	35.48	$ 1,459.86	$23,980.61
Balance, May 31, 1937			$ 6,267.05

ASSETS

Balance, May 31, 1937	$ 6,267.05
$5,000 U. S. Treasury Certificates	5,150.00
5,000 City of Evanston, Ill. Waterworks Ex. Bonds	5,463.83
2,000 Evansville, Ind. School Bonds	2,141.40
1,000 Rockford Sanitary District Bonds	1,086.21
Savings Account—First National Bank and Trust Company, Evanston, Ill.	5,000.00
Savings Account—State Bank and Trust Company, Evanston, Ill.	
(Deposits of Initiation Fees—$4,650.00)	
(Savings 3,628.81)	8,278.81
	$33,387.30

Report of the Executive Board

The Executive Board desires to present the following report of action taken at a meeting held in the Waldorf-Astoria Hotel, New York City, June 2, 1937:

After due discussion concerning the time and place of holding the next annual meeting, the Board directed the secretary to send a circular letter to the membership indicating that for the best interest of the Academy and its membership, it is the opinion of the Board that the present arrangements as to time be continued; however, the Board would like to have the expression of opinion of the membership. After reviewing the replies, the matter will receive further consideration.

The Board recommends that appropriation be made to cover the expenses of three members of the Committee on Mental Hygiene of the Academy in attending a meeting with a group from the National Committee on Mental Hygiene to be held in December, 1937, in New York City.

The Board approved the "Report by the Experts Who Met at Geneva December 11, 12, 1936, to Consider the Nutritive Food Requirements During the First Year of Life."

The secretary was authorized to revise the application blanks for membership to conform with the present requirements.

Recommendation was made that formal application for membership in the Pharmacopeia Convention in 1940 be submitted through the proper channels.

A request from the Medical Library Association asking the Board to pass upon a proposition for a Clinical Abstract Journal was received. The secretary was directed to request from the proper authorities further detailed information relative to such Journal and report at a subsequent meeting of the Board.

A recommendation contained in the report of Region III that cochairmen be appointed for Missouri, one to serve the eastern and the other the western half of the state, was approved.

The Board recommends that the state chairmen be appointed annually by the president.

The Board considered the results accomplished through the joint venture in a broadcasting program with the National Parent-Teachers' Association and the National Broadcasting Company. It was the consensus of opinion that such results merited the funds appropriated and continuance of such program under the proper auspices.

The secretary was authorized to furnish reprints of the report of the Committee on Immunization Procedures for distribution among the membership and to others who in his judgment may be entitled to such reprints.

The recommendations contained in the report of the Committee on Nursing Education (See paragraph 1, p. 138) were approved.

The Board also approved the recommendations contained in the report of the Committee on School Health and School Health Education and commended the committee for its very thorough report.

Dr. Cooley, secretary of the Council for Pediatric Research, presented in comprehensive form the purpose of such council and the objectives to be accomplished upon receipt of anticipated funds from the Carnegie Foundation. The report was approved.

The following applications for membership were approved:

Region I

Dr. Leon Antell, New York, N. Y.
Dr. John A. Askin, Baltimore, Md.
Dr. Nedjih Moustafa Bekir, Philadelphia, Pa.
Dr. Edward H. Blair, Hartford, Conn.
Dr. James E. Bowman, Philadelphia, Pa.
Dr. William F. Burdick, Washington, D. C.
Dr. Thomas S. Bumbalo, Buffalo, N. Y.
Dr. H. Chandler Clark, New Rochelle, N. Y.
Dr. Clement B. P. Cobb, New York, N. Y.
Dr. Robert S. Heffner, Pottstown, Pa.
Dr. Maurice M. Hillman, New Haven, Conn.
Dr. Clewell Howell, Baltimore, Md.
Dr. Robert E. Jennings, East Orange, N. J.
Dr. Maurice M. Malen, Philadelphia, Pa.
Dr. Rocco J. Martoccio, Utica, N. Y.
Dr. John G. M. Olmsted, Hartford, Conn.
Dr. Winthrop P. Partridge, Hartford, Conn.
Dr. S. Graham Ross, Montreal, Quebec, Canada
Dr. Alfred M. Wise, Brooklyn, N. Y.

Region II

Dr. G. L. Arrington, Meridian, Miss.
Dr. Arthur P. Black, El Paso, Tex.
Dr. Branch Craige, El Paso, Tex.
Dr. Clyde V. Croswell, Memphis, Tenn.
Dr. Ann Lavern Hays, Tulsa, Okla.
Dr. George S. Littell, Dallas, Tex.
Dr. Richard L. Nelson, Wichita Falls, Tex.

Region III

Dr. Florence A. Browne, Detroit, Mich.
Dr. George L. Drennan, Jacksonville, Ill.
Dr. Morgan J. Foster, Cedar Rapids, Ia.
Dr. Otto Grob, Detroit, Mich.
Dr. Ellis H. Harris, Winnetka, Ill.
Dr. Johanna Heumann, Chicago, Ill.
Dr. Noah Miller, Akron, Ohio
Dr. Margaret O'Neal, Zanesville, Ohio
Dr. N. O. Pearce, Minneapolis, Minn.
Dr. Rupert R. Rogers, Warren, Ohio
Dr. Alfred S. Traisman, Chicago, Ill.
Dr. Hugh Wellmeier, Piqua, Ohio

Region IV

Dr. May Borquist, Honolulu, T. H., Hawaii
Dr. William C. Cheney, Salt Lake City, Utah
Dr. Samuel G. Henriecke, Portland, Ore.
Dr. Hal R. Hoobler, Oakland, Calif.
Dr. Samuel Hurwitz, San Francisco, Calif.
Dr. Hubert E. Long, Berkeley, Calif.
Dr. Norman K. Nixon, Los Angeles, Calif.
Dr. James C. Parrott, San Francisco, Calif.
Dr. Ellen S. Stadtmuller, San Francisco, Calif.
Dr. Estella F. Warner, Albuquerque, N. M.
Dr. Ly Werner, Albuquerque, N. M.

Report of Region I

A retrospective glance over the pediatric situation in Region I reveals much that is encouraging. In certain states the work done during the past year has been deserving of the highest commendation. In none has it been entirely fruitless. In all of them it has been very clearly demonstrated that not only was a national organization of pediatricians needed, but always will be necessary. When one considers the development of Social Security laws, especially as they affect the lives of children, it is a matter of genuine regret that the Academy was not called into being long before it was, because no class of citizens is better qualified to speak for the rights of children and to outline their needs. Abundant evidence is at hand that through the Academy pediatricians now have the chance to be articulate and united. This fortuitous circumstance cannot help but add to the effectiveness of all measures which seek to make infancy safer, childhood happier, and youth more willing and better prepared to assume the burdens and privileges of adult life.

As plans have developed in various states the indications are rather clear that the most effective work the average Academy member can do is in conjunction with established agencies. If they are weak they may be strengthened; if they overlap, readjustment may have to follow, or if there is a genuine need to be met their activities may be directed into new channels to meet the need.

The impetus which may be given to child welfare work is well illustrated in Pennsylvania where Dr. Hamill and Dr. Stokes have recruited many Academy members for service. Their support to the state-wide campaign has not only been in the advisory field, but also in the very practical work of examination for and correction of defects. The expansion called for by the Social Security program necessitated the development of local pediatric institutes, all of which received the active support of Academy members. While the local organizations of these institutes and the methods of conducting them are by no means perfect yet, the experience thus far gained will be invaluable in the future. The Pennsylvania State Committee also met with the Committee of Medical Education of the state medical society for a joint discussion of pediatric problems throughout the state.

This tying up of the Academy with the state medical society and the state department of health has perhaps reached its greatest efficiency in New Jersey. Dr. Nichols, our state chairman, has initiated a series of conferences, study groups, and cooperative working schemes which probably can be repeated in all states with profit. New Jersey has published a handbook for the physicians of the state which drives home the importance of preventive medicine in no uncertain fashion and which is in a large measure due to Academy activities. The New Jersey membership, under Dr. Nichols' direction, has established working relationship with the maternal welfare committee of the state, with the school health educational department, mapped out refresher courses in pediatric education, especially in infant care; made the state conscious of the need of properly staffed baby health stations, and in the preschool field has shown the state society the need of officially adopting an examination card which serves as the basis for the summer roundup. More than any other state in Region I, New Jersey is seeking to solve the problems constantly arising from the growth of propaganda in favor of state medicine. Their plans always emphasize the personal relationship of the physician to the public and constantly reiterate the necessity of all Academy members having a vital part in the proceedings of the state society.

In Connecticut, the Academy is fortunate in having its state chairman, Dr. Linde, serve as chairman of the Public Health Committee of the state society. With him are associated five Academy members on this all important committee. Two main activities have engaged their attention during the past year. One is the work in

child health under grant of the Social Security Act, and the other a study of the proposed changes in the existing laws or new laws concerning child health and welfare. As in New Jersey, a committee of the Academy has arranged refresher courses for physicians practicing in the northeastern part of the state, where at present an intensive piece of work is being carried on in maternal and child health. The state has enrolled about 75 per cent of those eligible for membership.

Dr. Smith in Maryland reports that while no refresher courses in pediatrics have as yet been instituted there has been a distinct increase in the amount of pediatric instruction at all county medical society meetings and hospital staff conferences. There are also available two full-time pediatric consultants, who work with local practitioners in their individual problems and who likewise participate in community meetings.

In the District of Columbia, Dr. Donnally reports an increasing participation by Academy members in public health work, especially in a campaign against communicable diseases and in making available for study the local hospitals' records regarding neonatal mortality figures.

In New Hampshire, Dr. Rogers was appointed as a representative from the Academy to the Advisory Committee of the Division of Maternal and Child Health, and he further reports that the entire state work is now quite well covered. This holds true likewise for Maine and Vermont. In the latter state Dr. Johnson reports that an Academy member, Dr. Paul Clark, is state director under the Federal Maternity and Child Welfare Act. In Maine, Dr. Foster reports that he and Dr. Bauman both serve on the state society's General Advisory Committee to the Maine Department of Health. In Rhode Island, Dr. Utter and other Academy members have contributed valuable talks on pediatric subjects and expect to give lectures on pediatric education sponsored by the Social Security Act.

There is a growing appreciation throughout the North Atlantic States of what the ideals of the Academy are. This is evidenced in many ways and, considering the few years which have elapsed since its first annual meeting, there is every reason to look forward with confidence to the future.

Louis C. Schroeder
Regional Chairman

Report of Region II

The membership of Region II as of May 1, 1937, was 234. We had, at that time, six applications for admission. There was one resignation, Dr. Hugh J. Evans, Tulsa, Okla., as he has changed his line of practice from pediatrics to otolaryngology. There will be fewer admissions in the future because seven of our states report all available material enrolled. The other seven states have but few remaining who can qualify. The younger men who will be eligible when the time limit is up are constantly inquiring as to the qualifications necessary for admittance.

Probably our most important problem is working out conjointly with the already established agencies in the several states, a program under the Social Security Act. As the reports show, several of the states are now functioning and have received considerable funds. Others hope soon to have such a program inaugurated that will permit them to secure financial aid.

The annual regional meeting was held last year in Baltimore. The proceedings were published in detail in THE JOURNAL OF PEDIATRICS so it will not be necessary for repetition here, except to say that we are deeply indebted to Region I and our Baltimore hosts for a most instructive and enjoyable meeting, and we hope within the next few years to be so situated that we will have the opportunity of entertaining both Regions I and III and show them some of the work we are doing in the South.

Our next regional meeting will be with the Southern Medical Association in New Orleans. We are adopting a new plan which was passed upon jointly by the committee of the American Academy and the Council of the Southern Medical Association. In outlining this program we first changed the time of the meeting so that the Academy convenes the same day as the Section on Pediatrics of the Southern Medical Association; the program to be staggered. The pediatric section of the Southern Medical Association will meet in the morning and in the afternoon of the first day there will be clinical presentations by the pediatric profession of New Orleans. The second afternoon, there will be six round tables to be selected by the membership. Each member, between now and July 1, will receive a list of the round tables with probable leaders; the six receiving the most votes will be selected. It is hoped that each member will return this questionnaire very promptly so that arrangements can be made.

The business meeting will be held at a time to be selected later. It is felt by the regional chairman that enough members do not attend the business session. This is really the most important phase of the whole meeting from the Academy standpoint, when the members realize that this is their Academy and that the officers of the Academy will govern the policies according to the wishes of the majority, and that we can only know the wishes of the individual member as he expresses himself in meeting. This year let us have every member attending the sessions be present at the business meeting.

A detailed report of all state activities of this region will be given each member at the regional meeting this fall, and likewise published in THE JOURNAL OF PEDIATRICS.

Edward C. Mitchell
Regional Chairman

Report of Region III

The membership of Region III as of Jan. 1, 1937, was 341, of whom 340 were from the thirteen states and one was from Canada. Illinois now has 101 members. In addition, the regional committee has recommended 12 candidates for membership.

The annual clinical meeting was held in Cincinnati Nov. 20 and 21, 1936, under the auspices of the Cincinnati group and the chairmanship of Dr. Bell. A very excellent program was presented. The members of Region III greatly enjoyed the address of Dr. T. Z. Pottlesmith (A. G. Mitchell), on "What's Been the Matter With the Doctors During the Past 200 Years."

The meeting of the state chairmen was held at the end of the second day's program, that is, at the very end of the meeting, and a number of members had to leave before this was completed. I would suggest that because of its importance, the state chairmen's meeting be held during the morning session of the second day. The complete report of the state chairmen will appear in THE JOURNAL OF PEDIATRICS. The splendid state programs which have been developed in most of the states of Region III, of which I want to mention in particular Illinois, Iowa, and Michigan, have all received an added impetus by the functioning of the Social Security Act.

The next annual clinical meeting will be held in Chicago at the Lake Shore Athletic Club, Nov. 4-6, 1937, under the chairmanship of Dr. Maurice Blatt.

The most important development during the past year has been the beginning of maternal and child health work under the Social Security Act. In practically every state in Region III there is now a division of maternal and child health in the state department of health under the direction of a full-time medical officer especially trained in pediatrics or obstetrics, and in many instances with public health training. The state program outlined offers many opportunities for cooperation by

the Academy and the further development and continued progress of the work will depend to a considerable extent on the interest of the pediatrician. The duties of the members of advisory committees and of the actual workers with educational and preventive work have increased a great deal. Funds are now available to carry out a program, which in the past we had merely hoped for, and in the carrying out of which we have a great responsibility. The children's bureau through its advisory committee has cooperated wholeheartedly with the medical profession and our response will do much to influence the reaction of the public to our profession.

At the recent meeting of the Advisory Committee of the Division of Maternal and Child Health of the Children's Bureau, the proper functioning of the state advisory committee was extensively discussed, its importance stressed, and ways and means suggested to bring it about. This topic might well be made a special topic of discussion at the meeting of the state chairmen in Chicago next November.

At the annual meeting of the regional committee held in Chicago, April 17, 1937, the following recommendations were made:

1. That, in view of the scarcity of men eligible to membership in the Academy, an effort be made to organize physicians interested in pediatrics as affiliated with the State Academy group. Iowa, with only 19 pediatricians in the state and a population of two and a half million, was deemed an ideal place to make such a trial.

2. That cochairmen be appointed for Missouri, one to serve the eastern and the other the western half of the state.

3. That at the annual meeting there be some formal expression of our appreciation and interest in the program of maternal and child health being initiated by the children's bureau and the states' health authorities in the past year, and of our willingness to cooperate in carrying it out.

In this, my final report, I wish to thank the members of the regional committee, the state chairmen, and the general membership for their cooperation in carrying forward the work of Region III.

Henry F. Helmholz
Regional Chairman

Report of Region IV

There was on Jan. 1, 1937, a total membership of 107 in Region IV and at the annual meeting of the Executive Committee there are being presented ten new applications for membership. This accounts for a large proportion of the men actively and exclusively engaged in the practice of pediatrics in the Pacific region.

The growth of interest in the Academy is best attested by the attendance at the regional meeting which was held last year in San Francisco and was attended by more than three-fourths of the total membership. Distance interferes with large attendance from this region at eastern meetings and the annual regional meeting has rapidly become the most important pediatric meeting of the year for this section of the country.

Our next regional meeting is to be held in Los Angeles, November 4, 5, and 6 this year. The local group will arrange the program, but in contrast to the precedent of presentations entirely by the local membership, the new policy is to be instituted of representing the entire membership of Region IV on the program. It is proposed to add many of the features of the annual Academy meeting, especially the round table discussions, to this program.

Not only has pediatric activity on the Pacific Coast been centralized in the Academy, but in many localities associations of Academy members have formally or informally become the nucleus of activities in child welfare and all pediatric

endeavor. The latest of these developments is the project in Southern California to work out a plan for supplanting the Southwestern Pediatric Society, the strongest pediatric organization in the South, by an association of Academy members along the lines previously followed by San Francisco.

The chairman is greatly indebted for the cooperation of the state chairmen who recently reported in detail the progress in the various states. These reports can be summarized only in brief, but all bear testimony of the interest in the child as well as in the organized specialty and of the work to integrate the aid of governmental projects with the aims of the pediatrician for the improvement of child health and welfare. Not unnaturally, more has been accomplished by governmental agencies in the less populous states where less has been attempted heretofore. From the states which previously had better child welfare programs, there is expressed some uncertainty regarding the direction and objectives of the Social Security program for child health. Uniformly there is keen interest and an intense desire to serve.

Pediatric training, in the form of refresher courses, has been carried forward in many states, including Arizona, California, Nevada, Oregon, and Utah. In Arizona, the state chairman, Dr. Vivian Tappan, has just completed an extensive survey of child welfare projects in the state. In Idaho, with the cooperation of Dr. Harmon Tremaine, state chairman, and Dr. G. D. Carlyle Thompson, director of maternal welfare and child health, the current radio program on growth and development has been rebroadcast through local radio stations, there being no national outlet in Idaho. Dr. Joesting reports from Montana that excellent progress has been made under the state director of child welfare, Dr. Jessie Bierman; many of the common child welfare projects have been instituted. The first purely pediatric department of a hospital in the state of Montana has just been opened in St. James Hospital in Butte. In Oregon, an appointment has been authorized to carry out state-wide service and research under the direction of a full-time pediatrician. In Washington, the Social Security setup has been impeded by delay in enabling legislation. In Hawaii membership has been augmented by several recent additions; the territorial program of child welfare is under the direction of Dr. May Borquist. Dr. Meldrum K. Wylder has recently been appointed to the State Board of Health of New Mexico and is thus in a position to assist greatly in the furtherance of Academy objectives in this state.

The region recently suffered a great loss through the death of Dr. Donald K. Woods, of San Diego. A member of the Academy from its beginning, his energy and interest were unfailing. Known and beloved by the entire membership, he will be most keenly missed.

Edward B. Shaw
Regional Chairman

Report of the Committee on Child Health Relations

The Committee on Child Health Relations of the American Academy of Pediatrics has held no meeting during the past winter. Following the recommendation adopted at the June, 1936, meeting in Kansas City, the activities of the committee have been directed in the main toward the stimulation of state groups in their cooperative efforts with the various agencies administering the Social Security Act.

Each state chairman was requested to appoint certain members of the Academy to act as representatives of the Child Health Relations Committee in his state; these representatives to serve in an advisory or more active capacity to the state agencies administering those sections of the Social Security Act concerned with maternal and child health, child welfare, and the crippled child.

To date, representatives have been appointed in 33 states. In certain instances large committees have been appointed with subcommittees serving on advisory groups to the various administering agencies. In other states only one of two representatives serve as a liaison committee between the state agencies and the Academy. The activities of these representatives have been mainly advisory, although many have aided in giving extension or refresher courses in pediatrics in various communities of the state. The Child Health Relations Committee has furnished its representatives in each state with material which might be of service in their contact with state agencies.

In only a very few of the states is the Academy active in an advisory capacity to the agency administering the crippled children's section of the Social Security Act, and in a still smaller number of states are the members of the organization aiding in the child welfare program. The Committee on Child Health Relations wishes to stress the importance of the close cooperation of the Academy, not only in matters pertaining to the maternal and child health sections of the Social Security Act, but in those concerned with the crippled child and the dependent, handicapped, and delinquent child.

The committee feels that the welfare and health of the child can be greatly enhanced, particularly in the rural sections, by the promotion of local county groups composed of persons, both lay and professional, interested in all phases of child welfare. Such organizations should prove a great aid to the various state agencies entering a community to carry out the provisions of Title V of the Social Security Act. Cooperation between the Academy, the state department of health, the state department of public welfare, and various private professional and lay organizations would make such a program possible. It might be well for the Academy to consider seriously the advisability of sponsoring such a movement in the various states.

M. Hines Roberts, Chairman

Philip F. Barbour	*George M. Lyon*
W. L. Crawford	*Stanley H. Nichols*
Martha M. Eliot	*Oscar Reiss*

Report of the Committee on Clinical Investigation and Scientific Research

The Committee on Clinical Investigation and Scientific Research has considered the report by the experts who met at Geneva, December 11 and 12, 1936, to consider the nutritive food requirements during the first year of life, and recommends that the American Academy of Pediatrics send to the Health Organization of the League of Nations its general approval of this report.

Your committee has had no further business presented to it and there is nothing further to report for the year.

Fritz B. Talbot, Chairman

Wilburt C. Davison	*Oscar Schloss*
Henry F. Helmholz	*Francis Scott Smyth*

League of Nations Health Organisation. Studies on Nutrition

Report by the Experts Who Met at Geneva, December 11 and 12, 1936, to Consider Nutritive Food Requirements During the First Year of Life

1. In consequence of the decisions of the 1935 Assembly, the health committee last year set up a technical commission on nutrition. The commission drew up a report on "The Physiological Bases of Nutrition," together with a list of problems recommended for study.

2. The report and the list of problems were communicated to the principal scientific and social institutions of a number of countries, which undertook the proposed researches, generally through rapporteurs or special committees.

3. Among the first questions on the programme drawn up by the technical commission was that of nutritive food requirements during the first year of life. On a question of such essential importance to the health and development of the child, the commission desired to offer some guiding ideas on the lines of the fundamental principles of its report (see page 412, chapter "Infants," of the Report on the Physiological Bases of Nutrition, Quarterly Bulletin of the Health Organisation, Volume V, No. 3).

4. In view of the importance of the question, the health committee decided to hold a meeting of representatives of the various scientific and social institutions which had undertaken the researches in question. These had, of course, been entrusted mainly to pediatrists.

5. The meeting took place on December 11 and 12, 1936. A list of those present and the text of their report, which is to be sent to the institutions consulted for their approval, will be found hereunder.

6. The report contains a list of problems which call imperatively for study owing to the differences of opinion that still prevail in regard to them. The participants have divided these problems among themselves.

List of Participants

Austria: Dr. Edmund Nobel, Primararzt am Mautner Markhofschen Kinderspitale der Stadt, Universitätsprofessor für Kinderheilkunde, Vienna.

Belgium: Dr. Edouard Jean Bigwood, Professor at the "Université Libre," Bruxelles.

France: Prof. Pierre E. A. Lereboullet, Professor of Pediatrics, Paris.

Dr. Charles Lestocquoy, of the Ministry of Public Health, representing the Under-Secretary of State for Physical Education, Paris.

Prof. Jacques Parisot, Director of the Institute of Hygiene, Nancy.

Netherlands: Prof. Evert Gorter (Chairman), Professor at the University of Leiden.

Poland: Prof. Miecislas Michalowicz, Serator Professor of Pediatrics at the University Joseph Pilsudski, Warsaw.

Sweden: Prof. Urban Hjarne, Privat-Docent in Pediatrics, Upsala.

United Kingdom: Dr. Arthur Griffith Maitland-Jones of the London Hospital, London.

United States of America: Dr. Martha M. Eliot, Assistant Chief, Children's Bureau, United States Department of Labor, Washington.

A. Nutritive Requirements of the Normal Child

1. *Calorie Requirements.*—The number of calories should be adjusted to the individual needs of the child. It should be gradually reduced during the first year. The following can be given as average figures per kilogramme of body weight: 110 during the first quarter; 100 during the second quarter; 90 during the last six months; it being understood that fluctuations of 10 per cent above and below these amounts are regarded as normal.

2. *Protein Requirements.*—If the protein intake of breast-fed infants is computed, it works out at about 2 grammes per kilogramme. For bottle-fed children, the figure should be somewhat higher, i.e., on the average 3 grammes, with a range of fluctuation from 2 grammes to 4.

3. *Carbohydrate Fat and Mineral Salt Requirements.*—No figure is recommended in this connection in view of the great variation of these requirements.

4. *Duration of Breast Feeding.*—Breast feeding, which is always superior to artificial feeding, should be continued up to the age of six months at least, even where mixed feeding is resorted to. It is useful to continue partial breast feeding up to 9 months.

5. *Milk Intake.*—In both breast and artificial feeding, a total quantity of 750 to 800 grammes per day should not be exceeded. In most countries there is a tendency to effect a gradual reduction of this quantity, concurrently with the introduction of other foods, from the age of six months onwards, without, however, falling below 500 grammes. In certain other countries the milk intake is kept at the same level up to the age of one year and sometimes even increased, whilst at the same time mixed feeding is begun at six months or even earlier.

6. *Vitamin Requirements.*—Vitamin C. Vitamin C should be given as from the age of three months. If the mother has been on a diet deficient in this respect, the administration of this vitamin should begin in the second week of life. The quantity given to children should correspond to a daily dose of not less than 5 milligrammes of ascorbic acid, a quantity that can be represented by about 10 c.c. of orange or tomato juice.

Vitamin D. In various countries, during a certain portion of the year, the children get too little ultraviolet radiation, since it cannot penetrate the atmosphere. Vitamin D should therefore be prescribed for children living in such countries so far as they may not be effectively treated with ultraviolet rays. The dose to be recommended is 500 international units, as contained, for instance, in 6 grammes* of U.S.P. cod liver oil, but administrable also in the form of artificial preparations of irradiated sterols. The administration of vitamin D should begin at three months. In certain countries the administration of one-third to one-half of this dose during the first month is recommended, with an increase thereafter until the full amount is reached either in the second or third month.

It is advisable to give vitamin D to expectant mothers as from the beginning of pregnancy.

Artificial vitamin D concentrates should only be given under medical supervision, in order to avoid the risk of over-dosage.†

Vitamin A. It is not necessary to give a supplementary dose of vitamin A to infants fed in the manner advocated in this report, except for those on a diet of skim milk or buttermilk.

7. *Iron.*—The administration of iron to prevent anaemia is essential in the case only of premature children and twins. For these, the dosage of a pharmaceutical preparation (iron salt) should be 10 mg. in terms of iron. In special cases direct administration of iron salts may be ordered by the physician.‡

8. *Cereals.*—It is advisable to give a fairly large quantity of cereals after six months to all children whether breast fed or artificially fed (e.g., 15 to 25 grammes per diem). Before six months, smaller quantities are allowable (e.g., 5 to 10 grammes per diem).

9. *Vegetables.*—Vegetables should be started about one month after the cereals. Spinach, carrots, and potatoes should be given for preference. The quantity recommended is one or two tablespoonfuls of the cooked vegetables.

10. *Eggs.*—Eggs may be given during the second half of the first year, preferably towards the end, provided they are tolerated by the child.

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*In certain countries the quantity recommended is 8 grammes, rising, in some conditions, even to 12 grammes.

†Quoted from the "Report on the Physiological Bases of Nutrition," London Meeting (November, 1935) revised and amplified at the Geneva meeting (June, 1936) section on "Infants 0 to 1 year," paragraph on "Premature Infants" (Quarterly Bulletin of the Health Organisation, Vol. V, No. 3, p. 412).

‡Ibid.: paragraph on "Prevention of Anaemia."

11. *Meat, Soups.*—Meat broth may be used to prepare cereal gruels; it may be replaced by vegetable soups.

Exceptionally small quantities of finely chopped lean meat or fish may be given before the end of the first year.

B. Nutritive Requirements of Premature Children

Premature infants generally need a larger supply of calories than full-term infants. Stress should be laid on the necessity of giving them larger quantities of vitamin D and iron. In such cases, iron preparations in the form of iron salts are called for, just as artificial vitamin preparations are preferable to cod liver oil.

Certain children should be given an extra amount of protein and minerals (e.g., buttermilk).

C. Remarks on the Quality and Preparation of Foods

The foods given should be of good quality.

Milk, which should be obtained from healthy, well-fed cows, should be collected in a cleanly manner and, preferably after efficient pasteurisation following close upon milking, it should be boiled in the home. The milk should be quickly cooled after each heating.

Eggs should be as fresh as possible and well cooked.

Vegetables should be cooked with a minimum of water and finally divided after cooking. The cooking water may be used with advantage for the preparation of broths.

Cereals should also be well cooked.

During the summer, special precautions should be taken to keep the foods fresh.

Orange juice and tomato juice should be given fresh.

It is desirable to make arrangements to provide breast milk for children who need it and whose mothers are unable to feed them. For this purpose the creation of breast-milk depôts—affording all necessary safeguards in regard to the collection and preservation of the milk—is recommended. Such milk should be used more especially for the feeding of premature infants.

D. Influence of Infectious Diseases

The proper feeding of infants can only yield its full results if action can be successfully taken at the same time to preserve children from all infections: exposure to the air and to the sun is one method which may help to increase the infants' resistance to infections and improve their general health.

E. The Nutrition of Expectant and Nursing Mothers

A defective diet during pregnancy is harmful not only to the mother but also to the child as has already been pointed out by the Technical Commission.* The diet during pregnancy and lactation should contain fresh vegetables, fruit, milk, and cheese, meat, fish, or eggs.

Owing to the milk which the nursing mother has to supply to the child the diet during lactation should be distinctly more abundant than during pregnancy.

F. Necessity of Antenatal and Postnatal Supervision

The above technical indications are of value only if provision is made for periodical antenatal and postnatal medical and social supervision, for the benefit of children both in rural districts and in cities.

*See Table I (1) on page 410 of the above-quoted report "Dietary Scheme for the Pregnant and Nursing Woman."

G. Problems Recommended for Further Study

1. Has the daily administration of more than 750 c.c. of cow's milk to children between six months and one year any unfavourable influence on the nutritive exchanges and, in particular, on the absorption of calcium and iron?

2. What are the differences between the action of an artificial preparation of an irradiated sterol and that of irradiated milk, when quantities containing the same number of international units of vitamin D are administered?

3. Is it desirable to provide systematic preventive treatment against anaemia for all children between four months and one year by the administration of an iron salt?

Report of the Committee on Cooperation With Medical Groups and Societies

The Committee on Cooperation with Medical Groups and Societies has held no meetings during this past year. No matters have been presented before it for consideration.

Members of the committee feel that due consideration should be given to the Section on Pediatrics of the American Medical Association in planning the annual scientific meeting of the Academy.

Your committee is ready at any time to function when called on.

Hugh McCulloch, Chairman
Lee Forrest Hill *Ralph M. Tyson*
Frank C. Neff *William Weston*

Report of the Committee on Cooperation With Nonmedical Groups and Societies

The committee met for the first time in Kansas City at the annual meeting of the Academy in June, 1936.

At this meeting two topics were discussed: (1) the cooperation with the Parent-Teachers' Association in a growth and development project, and (2) the cooperation with the American Camping Association in the various health aspects of camp life. The latter group has a research fund of $20,000 a year for five years to study the camp problems. During the year a number of conferences were held with members of their research committee. Dr. Kaiser, on his way home from the meeting in Kansas City, stopped in Ann Arbor to discuss the cooperation with Dr. Twining, the president of the American Camping Association. The committee discussed the problem of minimal requirements and the possibility of a consultation service to various camp areas.

During the year, Dr. Norman Wetzel was added to our committee. He has had active charge of the "Radio Forum," a cooperative program put on by the Parent-Teachers' Association and the American Academy of Pediatrics. It consisted of a series of thirty-one talks on "Growth and Development" given over the NBC network every Wednesday from 4:00 to 4:30 P.M. The first broadcast was given October 31, and the last one May 19. (A list of the broadcast appeared on page 713 of Vol. 9 of The Journal of Pediatrics.)

Dr. Wetzel obtained the services of an unusually capable group of speakers to give these talks and he deserves a great deal of credit for the success of the forum. The talks have been very well received and to judge from the "fan mail" there should be a very good sale of the copies of the thirty-one talks which will appear in book form under the editorship of Dr. Wetzel. The officers of the Parent-Teachers' Association have been most cooperative and the success of the venture is due in

no small measure to Mrs. Langworthy, president of the Parent-Teachers' Association. It is hoped that the success of the forum will open the way for further cooperative projects.

Henry F. Helmholz, Chairman
C. A. Aldrich — *Lee Forrest Hill*
James W. Bruce — *Albert D. Kaiser*
Margaret I. Handy — *Norman C. Wetzel*

Report of the Committee on Hospitals and Dispensaries

During the years 1936 and 1937 the committee reported the data secured from questionnaires sent to contagious disease hospitals in this country and Canada. One hundred and three hospitals received questionnaires and from among the questionnaires returned, eighty-eight were used to compile the reports. The final summarizing report appeared in the January, 1937, issue of THE JOURNAL OF PEDIATRICS. This report concludes the work which the committee has been carrying on for the past three years in which children's hospitals, children's divisions of general hospitals and contagious disease hospitals were investigated by the questionnaire method and the findings reported in THE JOURNAL OF PEDIATRICS.

Clifford G. Grulee, Chairman
George F. Munns, Secretary — *Henry Dietrich*
Murray H. Bass — *Lewis Webb Hill*
Laurence R. DeBuys

Report of the Committee on Immunization Procedures

The committee has been busy arranging a comprehensive report on the value of the various methods of active and passive immunity. It was thought advisable to delay the final report until a meeting of the whole committee could be held at the annual session this year and to hand in a composite report a short time subsequently which can be published in this JOURNAL or mailed to the members at the discretion of the Executive Board.

John A. Toomey, Chairman
Horton Casparis — *Bela Schick*
E. J. Huenekens — *Edward B. Shaw*
Charles McKhann

Report of the Committee on Infantile Paralysis

This committee has not functioned during the past year, not primarily because of inertia but because there seemed to be nothing for the committee to do.

A. Graeme Mitchell, Chairman
D. Lesesne Smith
John A. Toomey

Report of the Committee on Legislation

The Committee on Legislation has not had occasion during the past year to consider any new matters of legislation affecting the membership of the Academy.

The latest legislation of interest to the membership was that of the Social Security Act, approved Aug. 14, 1935, which was considered briefly in the last report of the committee. Attention was directed by the committee to the publication of the U. S. Department of Labor entitled, "Grants to States for Maternal and Child Welfare Under the Social Security Act," which might be of interest to such of our members who officially or otherwise would be concerned in the administration of this Act.

Since the publication of this document the Children's Bureau has issued from time to time mimeographed reports on the administration of the Social Security Act to which attention is called for the benefit of those having interest in this legislative matter.

These bulletins, which are available from the U. S. Department of Labor, Children's Bureau, Washington, D. C., are as follows:

Proposed Plans for Further Development of Maternal and Child Health Programs; Report of Committee of State and Territorial Health Officers appointed to consider standards; adopted June 19, 1935.

Reports of Special Advisory Committees on Maternal and Child Health Services, Services to Crippled Children and Community Child Welfare Services as accepted and endorsed by the General Advisory Committee, Dec. 17, 1935.

Revised Plan for Development of Maternal and Child Health Programs; Report of Committee of State and Territorial Health Officers appointed to consider standards; adopted April 15, 1936.

Recommendations of Committee of State and Territorial Health Officers on Standards and Administrative Details for State Programs of Services for Crippled Children; adopted April 16, 1936.

Recommendations of the Advisory Committee on Services for Crippled Children Made at Its Meeting of Oct. 9 and 10, 1936.

Social Security Services for Mothers and Children; Administered by the Children's Bureau. Issued by the Children's Bureau, U. S. Department of Labor, December, 1936.

This publication comprises several numbers of "The Child," Vol. 1, No. 1, July, 1936; Vol. 1, No. 2, August, 1936, Vol. 1, No. 5, November, 1936, all correlated in publication 117143-O, U. S. Government Printing Office: 1937.

This symposium considers the Social Security Program for Children (by Katharine F. Lenroot); Maternal and Child Health Services (by Albert McCown, M.D.); Services for Crippled Children (by Robert C. Hood, M.D.); Child Welfare Services (by Mary Irene Atkinson); Federal Grants to States for Maternal and Child Welfare Services under the Social Security Act, with Table; State Agencies Administering Services under Title V, Parts 1, 2, and 3, of the Social Security Act, as of Dec. 10, 1936.

This last publication might be of interest to the membership as it contains a listing of the various officials with their locations, concerned in the administration of the legislation authorized by the Social Security Act.

Joseph S. Wall, Chairman
Isaac A. Abt — *Philip Van Ingen*
Jay I. Durand — *Alfred A. Walker*

Report of the American Board of Pediatrics, Inc.

The work of the American Board of Pediatrics this past year has been unusually heavy owing to the large number of pediatricians in Group I who applied for certification in the months previous to Sept. 30, 1936, when the time limit expired on the option of the board to "certification on record." Six examinations were held, as follows: Kansas City (annual meeting of the board), May, 1936; Albany, N. Y., June, 1936; San Francisco, October, 1936; Baltimore, November, 1936; Cincinnati, November, 1936; and New York City, January, 1937. A total of 163 candidates were examined of which 44 (27 per cent) failed. A two-day examination will be held at Atlantic City, June 6 and 7, at which 64 candidates are scheduled to appear.

As of April 1, 1937, 1,085 certificates have been issued by the board.

At the annual meeting in 1936, it was decided to appoint a group of official examiners for the board, who for purposes of examination may act as members of the board. This was necessitated by the need for regional examinations and the impossibility for geographical and financial reasons for calling the entire board for frequent examinations. It requires a team of eleven men to examine 32 candidates in one day. Doctors T. B. Cooley, Detroit; Horton Casparis, Nashville; W. W. Belford, San Diego; John L. Morse, Boston; Richard Smith, Boston; and H. L. K. Shaw, Albany, have been appointed to date. Three more examiners will be added which, with the nine members of the board, will make a list of eighteen official examiners.

Eleven of the twelve special fields, outlined by the Advisory Board on Medical Specialties and The Council on Medical Education of the American Medical Association, have organized boards and are holding examinations. A board for surgery, the twelfth, has been formed but is not as yet functioning. This rapid development of "Specialty Qualifying Boards" bears out the report of the pediatric committee in 1933 that in its opinion this would become the established method of regulating and raising the standards of specialization in America.

Now that the early work of the board is over, more and more attention is being given to the question of graduate education in pediatrics. There must be a gradual improvement of the training of residents who are to become the future pediatricians. Many problems are centered about the question of basic training. The board is going ahead slowly but ample evidence is accumulating that certification has already led to a marked improvement in the training of residents. At the February meeting of the advisory board the date at which full requirements must be met by candidates for all boards was postponed from 1938 to 1941.

Harold Coe Stuart
Borden S. Veeder
Alfred A. Walker

Report of the Committee on Medical Education

Postgraduate Education

During the past year this committee has made a survey in regard to (1) intramural postgraduate instruction within set teaching centers, (2) extramural postgraduate instruction of the refresher or extension course type, and (3) other methods of postgraduate instruction. The report is accordingly divided into three subdivisions.

Intramural Postgraduate Instruction.—There is relatively little opportunity for a general practitioner to go to a teaching medical center and get postgraduate instruction in pediatrics. Forty-one medical schools out of sixty-three reporting provide no such instruction. In the other twenty-two schools, few report more than a very fragmentary bit of instruction. Almost without exception there is no real attempt to provide general practitioners with a definitely organized review course in pediatrics. There has been a notable and commendable disappearance of short courses of the type which formerly made pediatric specialists out of general practitioners. Pediatric out-patient departments are frequently open to a limited number of physicians, but the work is rarely planned as a definite course of instruction.

Besides programs of the usual type mentioned, there are specific programs of interest. The Pediatric Seminar at Saluda, S. C., has been an important factor in postgraduate pediatric instruction in the South for years. At Vanderbilt University, through aid of a philanthropic foundation, rural physicians are brought in for review courses and compensated for the time lost from practice. In Michigan

a somewhat similar plan is providing opportunities for rural physicians in formal instruction at designated teaching centers. At Emory University a special program has been developed for colored physicians.

Extramural Postgraduate Instruction (Extension Type).—Activities in this field were well reviewed by the Committee on Pediatric Education of the Third White House Conference, 1930. Activities since 1930 have been surveyed by our present committee. The data and illustrative material comprising the complete report are bulky. Only a brief résumé is possible here.

There has been a definitely appreciated need for programs of this type as evidenced by attempts of state medical societies to organize such courses and to finance them from their own resources. Between 1920 and 1930 there were many attempts of this character. They were as a rule general in nature and did not emphasize pediatric instruction. Since 1930, however, largely through the influence of the Third White House Conference, there has been a decided increase in interest in both pediatric and obstetric courses of the extramural or refresher type, with no paralleling increase in interest in general medical review courses.

While the Commonwealth Fund aided materially in the development of the extramural program in Virginia (obstetrics, 1933 and 1934; pediatrics, 1934), and while the United States Children's Bureau had for some years provided extension courses in obstetrics in the South, the year 1936 will stand out as the beginning of a more or less nationwide increase in activities of this sort. This has been brought about almost entirely through the stimulation and financial support provided by the children's bureau.

States with unusually good extramural pediatric programs have been North Carolina, Virginia, West Virginia, Wisconsin, Alabama, Texas, Mississippi, and Iowa. Several other states have made less extensive attempts.

In most of the states where such programs have recently been initiated, an attempt has wisely been made to set up a tripartate arrangement in which the state medical society and the state department of health develop the program with the advisory guidance and financial support of the children's bureau. Administration is generally vested jointly in the hands of a committee selected by the state medical society to represent the medical profession and the director of the Bureau of Child Hygiene. It is important that this administrative responsibility be placed in the hands of a committee truly representative of the state medical society, and not that representing a special pediatric or obstetric group.

There are three types of programs which are essentially different in their functioning. The North Carolina plan, so named because it was first employed in that state in 1916, presents a unique administrative plan. As originally employed, six different centers arranged in a circuit had one clinical day a week for twelve consecutive weeks. In its more recent application in other states five different centers, arranged in a circuit, have had one clinical day a week for five weeks. In a given center the clinical day is held on the same day of the week, each week. This plan has many advantages, particularly in districts where physicians must drive from 50 to 100 miles to attend.

Equally important in the North Carolina plan is the alignment of the medical society, the extension division of the State University and the state department of health in an educational endeavor. In the original North Carolina plan, the state board of health, the medical school and the extension division of the University of North Carolina cooperated with the local medical society in working up the program. Expenses of organization were borne by the University of North Carolina and the state board of health. A fee was charged each member enrolled. In Virginia, the promotional activity was provided by the division of extension of the University of Virginia, a department not connected with the medical school proper. Medical

societies are rarely prepared to supply personnel for the very important work of organizing and promoting the courses. As things now are, the program is generally not well accepted when promoted too energetically by a health officer. No matter what the merit, the local physicians tend to be overly cautious of such overtures on the part of the health department.

The residence plan, as tried in Virginia, Alabama, and West Virginia, provides for the clinical instructor to stay in residence in the designated center for one to two weeks. In this plan the instructor has daily periods of instruction which generally take the form of formal lectures and clinics. The out-of-class hours he spends with the enrolled members in any such manner as will provide instructional assistance to them. Besides being adequate for the presenting of factual instruction, this offers the optimal opportunity for moulding attitudes with regard to pediatric procedures, particularly those promoting child health and protection. This program is the more taxing on the instructor and requires on his part more attentiveness and energy, but it is undoubtedly more effective. It is particularly suitable to the smaller groups where great distances do not have to be travelled daily by the attending members. In expense this type of program may exceed that of the North Carolina plan because as a general rule a group of over 10 to 20 is not desirable, while in the North Carolina plan 50 to 100 in a day may be more formally served. The outstanding feature of the residence plan is the opportunity for intimate instruction, a more genuinely acceptable and effective procedure with the physicians for whom the program is primarily intended.

Full-time clinical instructors in pediatrics have been employed in Maryland, Virginia, and Tennessee. They give instruction in formal classes, in demonstration clinics, or in private consultation. They vary their plan from place to place as need warrants, and getting to know the physicians individually, have opportunity for intimate instruction. This is a recent development in postgraduate pediatric education and too recent to permit proper appraisal.

It is apparent from the survey, that no one plan will suit all places. Programs of the type described are intended for the physicians who will not, or cannot, go to teaching centers for review work, particularly in pediatrics. As has been indicated in the report on intramural postgraduate instruction, the limited opportunities for such review courses further restrict the physicians desiring postgraduate instruction in pediatrics.

These extension courses are planned primarily for physicians in rural districts or smaller towns where opportunity for keeping up clinically is limited. Distinct failures have been observed in attempts to take these courses to the larger urban districts.

The selection of town and site, and of the day and hour of meeting, should so far as possible rest with the local medical group and be arranged to afford a maximum of cooperation and attendance.

For instructors those clinicians having a natural flare for informal teaching are most desirable. They should not be too young either in years of age or of clinical experience and should, if possible, have a definitely practical turn of mind. Their topics should be selected by a committee on maternal and child health, or by a committee on clinical education representing the state medical society, in collaboration with the director of the bureau of child hygiene. In this manner topics may be made to fit in with a long-time program as well as be adapted to specific local needs. Matters pertaining to child health and protection, including growth and development, rather than matters of pure clinical pediatrics have been more in demand by the attendants at these courses in the past.

Academy members can best aid in such programs by participating in regular medical society committees as individuals of the medical society rather than as

representatives of the Academy. In order to get a maximal response from the physicians of the state, it is desirable that no special pediatric or obstetric society try to organize or control such activities. In some states such activity has tended to prevent the development of an effective program. Academy members should support wholeheartedly such extramural courses within their state. When Academy members of appropriate ability are requested to give time as clinical instructors in such programs it is highly desirable that they do their best to cooperate, at least to the extent of devoting two weeks each summer to it even if at somewhat of a financial sacrifice to themselves. The great opportunity for the promotion of child health and protection, which these programs provide, can hardly be appreciated by those who have not actually participated therein.

Other Methods of Postgraduate Instruction.—This relates to a diversity of plans and methods which may be employed in promoting interest among physicians in regard to clinical pediatric problems, growth and development, and child health protection. Here are to be placed guidance in the selection of suitable pediatric topics for local, state, and county medical meetings, clinical days, and hospital staff programs. There is included also the providing of information in regard to special exhibits, lantern slides, movies, and sound movies which may be available and are suitable. Some interesting suggestions indicate that directed reading courses would offer a rich field of opportunity, just as it has in other fields of postgraduate education. The survey as regards this subdivision is not completed.

Finally, the committee has on file a bulky report of activities along the lines indicated. It will, during the coming year, again bring up to date the data for the intervening period. More detailed information in regard to the complete report is available at any time through the chairman. The committee desires to be of assistance to state chairmen, members of the Academy or others in regard to any of the information which may be had from the surveys or is in the complete report.

George M. Lyon, Chairman
Horton Casparis
Hugh L. Dwyer

Report of the Committee on Mental Hygiene

Mental hygiene offers opportunities and presents extremely interesting and important problems at the present time. It is concerned with the growth and development of the minds of children from birth through adolescence.

Dr. John Lovett Morse, in a recent address before the Philadelphia Pediatric Society, expressed concern over the future of pediatricians. He pointed out that the field of pediatrics has been materially narrowed by the increased knowledge of children acquired by the general practitioner and increased prophylactic measures against illness. He stated, "It is evident that the opportunities of pediatricians will not be as great in the future as they have been in the past. Forty years ago, pediatrics was a virgin soil; now it is overcultivated." Mental hygiene offers a solution of this problem. It is still virgin soil and is an even larger field than our early conception of pediatrics. If we include mental growth and the large number of behavior, school, and maladjustment problems in pediatrics, the field will be greatly broadened rather than narrowed.

Mental hygiene of children belongs in the pediatric field. There has been much discussion during the past few years about treating the child as a whole. Pediatrics has been defined as "interest in the problems of growth and development through adolescence." If we are to accept this definition, the mental aspects of growth must receive the same consideration as the physical. Because of the close correlation

and intricate interreaction between physical and mental growth, mental hygiene must be an important part of pediatrics and receive far greater consideration than in the past. Pediatricians who are the daily consultants of parents are in a position to observe and supervise mental growth better than any other group.

Pediatricians have professed an interest in mental hygiene but have not taken an active part in it. Papers on mental hygiene are rarely found on pediatric programs and are seldom seen in pediatric journals. In 1936, only two articles were worthy of consideration by the editors of the Year Book in pediatrics. The Committee on Mental Hygiene feels that the stimulation of an active interest of pediatricians in this field is important. There are at least three methods of approach.

The Third Conference on Psychiatric Education, held in Washington, D. C., a year ago, was devoted to psychiatric education in the setting of pediatrics. The general conclusion of the conference was that mental hygiene of children should be taught to undergraduate medical students and is best taught in the pediatric departments of our medical schools. Pediatric departments of many schools have excellent mental hygiene clinics. This teaching is usually done by members of the psychiatric departments and is therefore offered by psychiatrists whose chief interest is adults. In many medical schools there is no teaching of pediatric mental hygiene, or only a few hours. Dr. Ebaugh, chairman of the Committee on Education of the National Committee for Mental Hygiene, is of the opinion that the minimum teaching of pediatric psychiatry should be twelve hours. Most medical schools do not meet this requirement. We feel that the responsibility for this teaching should be that of the pediatric departments of the schools and that this committee, in cooperation with the Committee on Pediatric Education, should work toward this goal.

Each year, large numbers of physicians begin practice as pediatricians. They are very well trained in children's hospitals. They often spend two or three years as internes and residents. Yet very few of them are given an opportunity to study mental hygiene problems. They often enter practice with less knowledge of mental hygiene than the parents who consult them. The Mental Hygiene Committee of this society plans to cooperate with the Committee of Psychiatric Education of the National Committee for Mental Hygiene and suggest a program for more adequate teaching of this subject to medical students and internes and residents. That it can be successfully taught has been demonstrated in many places.

The American Academy of Pediatrics should devise means for promoting a more active interest in and a broader knowledge of mental hygiene among practicing pediatricians. A great deal of research work is being done and many very excellent reports on mental growth are being published in allied fields. This material seldom comes to the attention of the pediatrician. There are still divergent attitudes and conflicting opinions, particularly between pediatricians and psychiatrists. These differences are due partly to the superficial barrier of terminology and to different points of attack. Pediatricians observe mental growth daily and have a great deal of information which should help the psychiatrists. Psychiatrists who study deviations or abnormalities of mental growth have much information which should be of help to the pediatricians. In order to bring these two viewpoints together, arrangements are being made for a permanent committee of the National Committee for Mental Hygiene to work with our committee. The National Committee for Mental Hygiene has set aside one day at their annual meeting in New York in December to consider the whole problem of pediatric psychiatry. They hope that a large number of pediatricians will attend that meeting. They are extremely anxious to cooperate in any way.

The third possible approach to the problem is through cooperation between the American Academy of Pediatrics and the various educational groups such as was done so successfully with the National Parent-Teachers' Association and the Academy last year.

The Mental Hygiene Committee of the Academy is extremely anxious to carry out a permanent and constructive program. It can only do so with the suggestions and cooperation of all the members of the Academy. Three avenues of approach are suggested in this report. There are others, no doubt, which will develop as work proceeds. The success of this work will depend upon the support the committee receives from the members of the Academy.

Bert I. Beverly, Chairman
C. Anderson Aldrich *Arthur H. Parmelee*
Horton R. Casparis *Victor E. Stork*
Bronson Crothers

Report of the Committee on Nursing Education in Pediatrics

Your committee has made a study of the present courses given for graduate training in pediatric nursing. Its activities this year have been confined to this particular subject.

Information available would indicate that there are offered about 26 courses in graduate training in pediatric nursing. The institutions and organizations involved have been communicated with and replies have been received from 23. Three courses have recently been discontinued, namely, at the New York Post-Graduate Medical School and Hospital, the Indiana Medical Center, and the Children's Mercy Hospital, Kansas City, Mo. Three institutions did not reply. The material received and the information obtained from various catalogues have been studied.

The accompanying report, Exhibit A, is an analysis of 20 of the courses and gives such information as the title of the course, the nursing school with which it is affiliated, university affiliation (if any), hospital affiliation, the daily number of patients in the institutions used in teaching, general educational requirements, the length of the course, the type of subjects offered including conferences and ward practice, the matriculation fee; and whether or not maintenance is allowed, honorarium paid, and the availability of scholarships.

A few interesting facts come to light in studying the material. In only three instances, apparently, is there any university affiliation. In all instances the courses are given in institutions which appear to have a sufficient daily census of patients to be rated as satisfactory. Practically all of the schools require four years of high school in preliminary education. The titles of the courses vary so greatly that an analysis is impossible in estimating whether the content of the educational material justifies the title. In most instances it appears that the definition of the course is a clear and honest one. For example, in one course given at the University of Washington, Seattle, the title of the course is "Supervision and Ward Administration." In this approximately five hours a week are given in class, forty-four hours in ward practice and two hours in conference and clinics, and twelve months' residence is required. These figures alone hardly tell the story, but it is probable, since there is in this instance university affiliation, that the course is a serious one. Other courses, for example, are listed as "Advanced Pediatric Nursing." Some are noted as "Postgraduate Courses" or as "Added Experience" and these are usually given over a period of four to six months.

It is not clear from the report how much educational matters are stressed or how much the nurse is used for additional nursing care in the institutions giving the courses. Probably a great deal of time and personal study of each institution would be necessary to determine this.

EXHIBIT

COURSES AVAILABLE FOR GRADUATE

TITLE OF COURSE	SCHOOL, CITY, AND STATE	HOSPITAL		DAILY AVERAGE NUMBER OF PEDIATRIC PATIENTS	UNIVERSITY AFFILIATION	GENERAL EDUCATIONAL REQUIREMENTS	APPLY TO
		GENERAL BED CAPACITY	SPECIAL BED CAPACITY				
Postgraduate course	Children's Memorial, Chicago, Ill.		264	155	No	4 HS[13]	Director of nursing
Graduate course in pediatric nursing	Michael Reese, Chicago, Ill.	606		90	No	4 HS	Director of nursing
Pediatric postgraduate course	Milwaukee, Wis.	County General, 1,000		65	No	4 HS	Supt. of nurses
Postgraduate course	Children's Hospital of Michigan, Detroit, Mich.		Children's 237	204	No	4 HS	Director of nursing service
Added experience course	Babies' Hospital, New York City		154	98	No	4 HS	Supt. of nurses
Postgraduate course	Bellevue Hospital, New York City	Bellevue, 2,313		250	No	4 HS	Director of supervision
Postgraduate course	Children's Hospital, Columbus, Ohio		Children's 105	79	No	4 HS	Supt. of nurses
Course for postgraduates	Gillette State, St. Paul, Minn.		Crippled Children 245	132	No		Supt. of nurses
Pediatric nursing	Milwaukee Children's, Milwaukee, Wis.		155	105	No		
Advanced supervising	University of Washington, Seattle, Wash.	King's Co. General, 370		35	Yes	4 HS[1]	Director of nursing education
Advanced pediatric nursing	University of Oregon, Portland, Ore.		Doernbecker		Yes	4 College	Director of nursing education
Postgraduate pediatric nursing	University of Minnesota	325		78	Yes	4 HS	Registrar nursing
Advanced pediatric nursing	Children's Hospital, Cincinnati, Ohio		Child's 192	140	Yes	4 HS	Director of nursing education
Postgraduate course	Illinois, Springfield	417		49	No	4 HS	Dean of nursing
Added experience	Children's Hospital, Pittsburgh, Pa.	Children's	117	117	No	4 HS	Director of nursing
Added experience	Children's Hospital, Philadelphia, Pa.	Children's	104	104	No	4 HS	

A

NURSES AND PEDIATRIC NURSING

LENGTH OF COURSE—MONTHS	CLASS	WARD PRACTICE	CONFERENCE AND CLINICS	GRADUATE STUDENTS ATTEND UNDERGRADUATE CLASSES	MATRICULATION FEE	TUITION	MONTHLY ALLOWANCE	MAINTENANCE PROVIDED	MEDICAL CLASSES GIVEN BY PHYSICIANS
6	15	41		Yes	0	0	0	Yes	Clinical pediatrics only
4	4-5	48	1½	No	$10	0	$8	Yes	12 hr. medical pediatrics
4	2	46	0	Both	0	0	0	Yes[14]	No students 1936
6	4½	8 hr. per day	10	Yes	0	0	$8	Yes	Theory 24 hr. pediatrics, undergraduate
13 wk.	5	48		Yes	0	0	0	Yes	Undergraduate
6	3	42	5	Both	0	0	0	Yes	Pediatrics e undergraduates
4	6	42	1	Yes	0	0	0	Yes	
6 to 12	12	42	6	Yes	0	0	0	Yes	Orthopedics, pediatrics, social service
12	2-3	48	6	Both	0	0	0	Yes	
12	5-7	44	2	No	$10[2]	$5[3]	$45[4]	Yes	
9	9	18	4	No	0	$90	0	No	Advanced pediatrics for nurses
12	3+	42	4	Yes	$5	0	$10	Yes	
12	14[5]	28	2	No	0	$275[6]	0	No[7]	Advanced clinical pediatrics
4	6	44		No	$10	0	0	No[8]	Same course undergraduate theory
4	5	48	2½	Both	0	0	0	Yes	
6	4	48	1	Both	0	0	0	Yes	Orthopedics, medical correction in children

EXHIBIT A

TITLE OF COURSE	SCHOOL, CITY, AND STATE	HOSPITAL		DAILY AVERAGE NUMBER OF PEDIATRIC PATIENTS	UNIVERSITY AFFILIATION	GENERAL EDUCATIONAL REQUIREMENTS	APPLY TO
		GENERAL BED CAPACITY	SPECIAL BED CAPACITY				
Added experience	Boston Floating, Boston, Mass.	Boston Floating	36	36	No	HS	
Supplementary course graduate students	Boston Children's, Boston, Mass.	Children's	218	196	No	4 HS	Director of school of nursing
Graduate course	District of Columbia	Children's	140	140	No	4 HS	Supt. of nurses
Postgraduate course	Baltimore, Md.	Johns Hopkins, 721		75	No	4 HS	Supt. of nurses

[1]Prerequisite courses.
General economics 5 credits
Sociology I 5 credits
General psychology 5 credits
Nutrition 5 credits

[2]Fee each quarter.
[3]Fee each quarter.
[4]Salary first 3 quarters (per month).
No salary—practice.
Supervisor—last quarter.
[5]Includes 6 hr. field work.

In the gathering of material and in the preparation of this report a large amount of work should be credited to Miss Corinne Bancroft, Director of Nursing Education in the Children's Hospital, Cincinnati. Miss Bancroft is also a member of the Committee on Curriculum Study of the Undergraduate Course in Pediatric Nursing of the National League of Nursing Education. The report of this committee has been completed and published, and is available. There is a committee of the National League of Nursing Education, on Graduate Study, which so far has not functioned. Miss Bancroft is also a member of this committee.

The recommendations which might be made are as follows: That the Committee on Nursing Education in Pediatrics of the American Academy of Pediatrics continue the study of nursing education in cooperation with the National League of Nursing Education through its already established committees. It would appear justifiable also to suggest that more of the courses should be given in affiliation with universities and that in some way it be assured that local pediatricians connected with universities or with children's hospitals be involved in the teaching of graduate nursing and give serious consideration to the contents of the courses in an advisory capacity. It is not suggested that satisfactory graduate courses in pediatric nursing cannot be given except with university affiliation, since well-organized hospitals with strong nursing departments and interested pediatric staffs could well give these. There would appear to be a need for the National League of Nursing Education and some such organization as the American Academy of Pediatrics to evolve minimum standards which would be acceptable in graduate training in pediatric nursing. Your committee is, however, not ready to make any final statement as to the content of such a course and feels that such a plan should be a cooperative one agreeable to the organizations mentioned.

A. Graeme Mitchell, Chairman
Stanley Gibson *William A. Mulherin*
William Palmer Lucas *Charles A. Weymuller*

—CONT'D

LENGTH OF COURSE—MONTHS	CLASS	WARD PRACTICE	CONFERENCE AND CLINICS	GRADUATE STUDENTS ATTEND UNDERGRADUATE CLASSES	MATRICULATION FEE	TUITION	MONTHLY ALLOWANCE	MAINTENANCE PROVIDED	MEDICAL CLASSES GIVEN BY PHYSICIANS
4	4	48[10]	4	Both	0	0	$10	Yes	Pediatrics
6	3-4	49	½	Yes	0	0	0	Yes	Undergraduate course pediatrics
6	4-5[11]	48	2-3	Both	0	0	0	Yes	
4	3	52	1	Yes	0	0	0	No[12]	Undergraduate pediatrics

[6]Limited number of scholarships available to cover tuition.
[7]Maintenance provided for 28 hr. service to hospital.
[8]Board and laundry furnished.
[9]Includes 1 month orthopedic nursing.
[10]First two months—18 to 40 thereafter.
[12]Board and laundry furnished.
[13]No grade below 75 per cent; majority above 80 per cent.
[14]Students reimburse hospital $25.00 per month for maintenance.

Report of the Committee on Revision of the Pharmacopoeia

The committee reports the appointment of Dr. Bernard Fantus to replace the late Dr. John Ruhräh.

This year has been one of planning and preparation. An experiment in Philadelphia has been worked out, whereby the neighborhood druggist, through window display, distribution of circulars, and personal suggestion, will act as an ambassador to the family in the cause of popular health knowledge—especially with regard to infant care. This educational campaign, scheduled for the first week in May, is intended as a test, with a view to national development.

The following topics and problems constitute in part the program arranged for next year: The committee will study chemicals, galenicals, and biologicals important in the practice of pediatrics to discover their exact values, and to determine practicable means of administering remedial agents to infants and children, and to present a critical analysis of such vehicles; we will offer to the officers of the *United States Pharmacopoeia* and *The National Formulary* suggestions concerning additions to or deletions from the next revisions; we will consider posologic scales and the advisability of adopting a compendium with a formulary for various clinical entities; and we will survey the extent and character of instruction in pediatric therapeutics in our American medical colleges.

Applications will be filed for representation in both the *United States Pharmacopoeia* and *The National Formulary* conventions.

Finally, the committee proposes to study and evaluate the many new chemicals, compounds and preparations of interest to pediatrists which appeared during the year in the eleventh revision of the *United States Pharmacopoeia* and the seventh edition of *The National Formulary*. Two papers outlining the method of procedure that will be followed in these investigations were read before the Pennsylvania State Medical Society and may be found in the *Pennsylvania Medical Journal*, June, 1936.

Isaac A. Abt, Chairman
William N. Bradley
Bernard Fantus
Louis W. Sauer

Report of Committee on School Health and School Health Education

Pediatric Practice and School Medical Services

The Response of 687 Members of the American Academy of Pediatrics to Questions Proposed by Their Committee on School Health and School Health Education

The tabulation of the replies to the first 9 questions of the questionnaire is presented with comments and the interpretation of your committee.

We have included only the high points in the response to the other questions which were designed to discover suggestions for improvement. We consider that they should be presented in more detail later. These questions brought forth extended comments and deserve much more study than is possible before the annual meeting. While many of the replies are rather brief opinions, there are also such thoughtful statements and expressions of fact from definite experience that they are a distinct contribution to the problem.

It is apparent, however, at this stage of our study of the problem that some general principles should be found which might be acceptable to leaders concerned with the development of medical service in the schools. These principles are not offered as covering all problems nor as a comprehensive school health program, but as suggestive of program policy.

The Replies

The Response to the First Nine Questions of the Questionnaire

The questionnaire was sent to the entire membership of 1,138 with 687, or 60 per cent, replying. When the respondent indicated that particular questions did not apply to him because of a full-time position as teacher in a medical school, or as school physician, the question was omitted and the percentage is based on the others replying to that question.

Every question was answered in over 50 per cent of the replies. Twelve per cent of the replies omitted the last four questions.

The distribution of the replies according to the size of the city is indicated in Table I. No important differences were noted in the replies from different sized cities, except as indicated in the first two and the eighth questions.

Table I

GROUP CLASSIFICATIONS	SIZE OF CITY	NUMBER OF REPLIES RETURNED	PER CENT OF TOTAL
Total	All cities	687	100.0
A	Over 1,000,000 population:		
	1. New York City	80	11.6
	2. Other than New York City	71	10.3
B	500,000 to 1,000,000 population	82	11.9
C	100,000 to 500,000 population	229	33.3
D	10,000 to 100,000 population	205	29.8
E	Under 10,000 population	20	2.9

Group A2, other than New York City, includes the following: Chicago, 32, Philadelphia, 20, Detroit, 11, Los Angeles, 7.

Group B represents 10 cities, Boston leading with 18 questionnaires, San Francisco, 15; others in order of number of questionnaires received: Cleveland, Pittsburgh, Buffalo, Baltimore, St. Louis, Milwaukee, Toronto, Montreal.

Group C represents 68 cities, highest number of questionnaires from any city, Cincinnati, 10.

Group D, 156 cities. Oak Park, Ill., leading with 7 questionnaires.

Group E, 19 cities.

QUESTIONS ON THE SCHOOL MEDICAL AND NURSING SERVICE IN YOUR COMMUNITY

In some cities the school asks the parents to take their child to their family physician for the routine health examination, then the school physician examines only the children who fail to bring a report from the family physician.

Question 1: Have any children come to you for such an examination during the past school year?

Answer: Yes

A1. 94.9 per cent
A2. 62.3 per cent
B 66.7 per cent
C 69.4 per cent
D 72.4 per cent
E 61.1 per cent

Total for all cities replied "Yes," 72.0 per cent
No, 28.0 per cent.

Question 1, Part 2: If so, how many examined?

Answer: Less than 10, 202; 10-25, 151; more than 25, 115; number not specified, 12.

With each population group except Group *D* the largest number reported that less than ten children were examined. In Group *D* the largest proportion reported 10 to 25 were examined.

Question 2: Were you provided with a medical record form furnished by the school for recording the results of such an examination?

Answer: Yes (of those reporting examinations)

A1. 91.9 per cent
A2. 48.8 per cent
B 61.1 per cent
C 51.9 per cent
D 48.6 per cent
E 63.6 per cent.

Total percentage where such forms were provided, 58.1. Among those reporting one or more examinations, a few more reported sometimes or not at all.

Question 3: If the school carried on an active educational campaign with the parents, do you believe that it would be practical to persuade an appreciable number of entering pupils to be examined in private physicians' offices?

Answer: Yes, 94.2 per cent; No, 3.6 per cent; Doubtful, 0.9 per cent; No answer, 1.3 per cent.

The following comments are representative of those who answered no, were doubtful, or made comments:

"Yes, in the suburbs." "Yes, in private schools." "A continued educational campaign would bring more each year." "Proper education would reduce to a bare minimum of Christian Scientists."

"Doubt if many children would get to the family physician as long as they are taken care of elsewhere as at present." "I doubt it. As long as free school examinations are given, most will take advantage of them." "Depends on the campaign."

"No, in case of the public schools. It might be a good idea, but very difficult to get across." "Not as a routine for school purposes." "Have not found it very effective." "No, perhaps 20 per cent." "Why should they? Probably better to have it done by good school physician rather than random by family physician."

Question 4: About what percentage of the entering pupils in your community do you think might be examined in private physicians' offices?

Answer: Percentage who might be examined: Under 20 per cent, 18.2; 20 to 49 per cent, 27.1; 50 to 74 per cent, 30.2; 75 to 100 per cent, 24.4.

The percentages that they thought could be examined in private offices varied so much, it is quite obvious that no conclusions can be drawn except that the physicians generally believed that many might be examined in private offices.

Question 5: Have any school or health officials in your community requested from you during the past two years specific recommendations as to modifications of the school program which would be of benefit to children either from the point of view of physical or mental hygiene?

Answer: 75 per cent reported "Never," only 10 per cent reported "More than once," and only 8 per cent reported "Frequently."

Question 6: Has the school nurse or school physician asked your advice regarding the needs of a pupil during the past two years?

Apparently the school physician or school nurse has asked for advice all too infrequently, but the response was not so overwhelmingly "No" as when we asked if the pediatrician had been requested to give specific recommendations as to modification of the school program. Question 6, of course, may include any request about a child and does not require any such a working basis of cooperation between the school and the private physician as with question 5.

Answer: About 51 per cent reported "No," about 5 per cent "Once," about 31 per cent "More than once," and 13 per cent "Frequently."

Question 7: Would you welcome such requests for cooperation?

Answer: Only one reported "No" that he would not welcome such cooperation and he said, "No, under the present setup. A waste of public money. Incompetent examiners, inefficient examinations. Biased opinions of the head of the department."

Only four qualified their assent to welcoming such requests for cooperation and they said: "Yes, if it was the right kind." "Yes, if I thought the work could or would be followed up intelligently or persistently." "Yes, if the suggestions can be and are carried out." "Yes, passively."

Question 8: Has the school nurse or school physician contacted you during the past two years asking your approval of the school nurse explaining to parents the need for further medical care of any of your patients?

Answer: We may conclude that it is rare for the school nurse or school physician to contact the private physician for approval of the nurse explaining to parents the need for further medical care in the larger cities and

that it is somewhat more frequent in the smaller communities.

A1. 88.5 per cent, "Never"

A2. 85.5 per cent, "Never"

B 82.7 per cent, "Never."

Only three physicians reported "Frequently" to this question in cities over 1,000,000 population and we suspect this refers to contacts in private schools.

The per cent of sizes of cities was:

75.9 per cent, "Never"
2.6 per cent, "Once"
14.9 per cent, "More than once"
5.1 per cent, "Frequently"
10 replies not applicable.

Question 9: Are you willing to have the school nurse talk with the parents of your patients regarding the need for further medical attention in those instances in which the parents have neglected to secure treatment for physical defects? It is understood that in such cases the nurse would consult you regarding what she should say.

Answer: 97.5 per cent "Willing."

Of the few answering "No," most of them made such comments as the following: "No, because they would refer them to the school physician." "I have found that the information given by school nurses is very inaccurate so that I would hardly want them to talk for me." "No, under the present setup." "Doubtful; most school nurses ride hobbies." "School nurses so often urge removal of tonsils when visible regardless of lack of other indications." "School nurses are doing much too much prescribing, diagnosis and treatment."

A number put stress on the importance of the nurse consulting them as to what she should say and some expressed doubts as to whether the nurses were properly trained to realize the importance of following the advice of the private physician.

Comments and Conclusions on the First Nine Questions of the Questionnaire

These replies suggest that the public schools do not send many patients to private offices for health examinations although most of the physicians reported a few children had come for this purpose. However, as there was a large proportion who did not have a medical record form furnished by the school, it appears obvious that many schools do not try to obtain examination reports from private physicians. It was clear in many instances that parents had brought their children, in spite of the free examinations offered in the public schools and that many children in the larger cities had been referred from private schools.

When the School Health Program is truly educational, we may assume that the school will make an effort to teach parents the value of continued medical health supervision by their personal physician who has known their child in sickness and in health. We might assume, also, that the children are trained to feel a personal responsibility for obtaining the best preventive medical service that they can afford. As the school examination is necessarily limited and can hardly presume to give all children a worthy example of a health examination, it is appropriate that the school's effort for education in health attitudes should provide for emphasis upon examination by the private physician, so far as the parents can afford this service.

It seems likely from these replies that the public schools have generally neglected this opportunity to educate for attitudes toward health examinations.

It is the opinion of your committee that any educational program should hold fast to the highest ideals of modern medicine in presenting the subject of health examinations and health supervision. We believe, therefore, that the educational standard presented should be concerned with an individualized medical service rather than the kind of service that deals with large groups. We agree also on the importance of education for self-reliance and personal responsibility as expressed in the following quotation from The Hoover White House Conference Report on "The School Health Program":

"In their enthusiasm to serve as fully as possible, the schools often assume functions that might better be left to private or individual initiative. While the promotion of health is one of the cardinal objectives of the school program, no service should be performed in such a manner that it takes away fundamental privileges or responsibilities of the home in relation to its children. Any policy that does for the individual what he can do for himself leaves him more dependent and less able and willing to care for himself when the protective hand is withdrawn. The test of the effectiveness of the school health program is not so much what is done about health during the years while the child is in school as the extent to which proper health attitudes persist and dominate throughout life."

With 94 per cent of the pediatricians expressing their belief that it would be practical to persuade an appreciable number of entering pupils to be examined in private offices, your committee regards this opinion from our membership as a challenge to health educators. We believe that this vote is a challenge to all who are in a position where their leadership might influence the character of the health education program. Of course, we must continue to make provision for the examination and care of those who cannot readily employ private medical service, but we believe that all who are responsible for school health programs must face the problem of how to educate the public to want the kind of individualized examination and service that it is possible to give when the physician has really supervised the health of the child over a period of time. This is a joint problem for educators, public health workers and physicians. At this stage we must make the problem clear and gain a recognition of the need for education in attitudes toward health examinations. We must make clear that the whole problem cannot be solved by providing free examinations in the schools.

The replies indicate further that many pediatricians recognize the responsibility of the medical profession to provide such advice and health supervision that parents will appreciate the value of this personal service. The comments are not all concerned with getting more children into private offices, but they also emphasize the need for more training of physicians and better health supervision advice for the children who do reach the private physicians.

Numerous comments on the questionnaires, as well as the other studies of this problem, have led your committee to the conclusion that the attempt to meet the whole need for health examination through free examinations in the schools has led to confusion, a false sense of security and depriving children of satisfactory health supervision among many of those able to afford the care of a private pediatrician. A lack of education of teachers as well as parents regarding the limitations of the school examination has been an important factor in this confusion; and when the school service presumes to take over the whole responsibility without the active cooperation of the private practitioner, the public is not likely to learn the distinction between pediatric health supervision and the limited applicability of the school service.

The responses to questions 5, 6, and 8 show a lack of working relationship between the school health service and the pediatrician. Questions 7 and 9 indicate generally, a willingness on the part of the pediatricians to share in the school health service.

Of course, if the school makes no particular effort to educate for health examinations by the private physician and does not seek to obtain examination report forms from the pediatricians, it is not surprising that our replies indicate the school officials have not made frequent contacts with the pediatricians.

When the pediatrician has cared for a child in sickness and in health and from infancy into school life, we may expect that he is in a better position to advise as to the needs of his patient than the school physician. Most pediatricians who care for school age children will have patients who should have advice on school hours, on extracurricular activities which may cause overfatigue or strain, or even on the amount of participation in the regular curriculum. Some patients will need restriction in physical activities, extra rest periods, or advice on school lunches; others will need encouragement for a broader activity program, or special exercises. Some will have handicaps and habits of behavior which should be known to the school staff in order to assist the child in a proper adjustment to his environment. In any case, the school officials should know that the service of the pediatrician is so fundamental to the health of his patients that his advice should be used to adjust the school program to meet the individual needs of the child.

It may, to some degree, be a feeling of self-sufficiency on the part of the school health personnel that there is not more effort to seek the advice of the private practitioner about the care of pupils. Certainly, the lack of effort to educate for private office examinations as well as the replies to the last 4 questions of our questionnaire indicate that in many situations the private practitioner has not been given a real place in the planning of the school health program.

When we remember that many school programs are guided by lay officials and the medical staff is employed on a part-time basis and have given little time to a study of the educational and community-wide significance of the school health service, we may feel gratified that there has been as much contact with pediatricians as there has been. The fact that so many pediatricians expressed a willingness to cooperate indicates clearly that much more can be accomplished when our school health leaders have recognized the part that the private physician might play in the program.

With a clearer recognition of the contribution of the private practitioner to the service, we may expect also that more interest will be shown by the schools in the follow-up of the children examined by the private physicians. If the parent who goes to a pediatrician has neglected to secure treatment for physical defects, the school will consult the pediatrician as to the recommendation he has made and the advice that he wishes to be given. Such cooperation will go far to develop a better understanding and rapport between the school and the private practitioners.

High Points in the Replies Asking Suggestions for Improvement

Question 10: Have you any community plan to propose that you think is practical for periodic medical examinations or inspection of school children to supplement the observations of the school nurse and teacher in order to discover (screen) all children in need of medical care? This question is intended to obtain any suggestions you have as to a plan that might be used as an alternative to the usual plan of a physician examining in the public schools.

a. For those who fail to have a health examination by a private physician?

b. For those who can afford only part of the regular medical fees for health examination?

c. For those who can afford no part of the regular fees for health examinations?

Answer: a. The answers to the first part of the question were most often an expression of a belief in the efficacy of more education of parents. A surprisingly large number, however, indicated a belief in some kind of law that would compel parents to take their children to their private physician for an examination, and nearly as many expressed approval of the school providing free examination, but over one-quarter of these mentioned the importance of an attempt to persuade the parents to take their children to their private physician before the school examination is offered.

b. The plan most frequently proposed for obtaining examinations of those who can afford only part of the regular medical fees was that the private physicians should scale the fee to meet the patient. A few mentioned the need for investigation before the patients were accepted for reduced fees. A willingness to rely on their local medical society to work out a plan was also frequently expressed. Again we find a considerable number accepted the present arrangement of free examinations in school as satisfactory.

c. Three proposals for providing examination of those who can afford no part of the fee were mentioned with about equal frequency. These proposals were: free examinations in school; examinations in clinics; and free examinations in private offices. Again we find occasional mention of the need for investigation of the economic status before the examination is offered free. Fifty physicians mentioned that the physician should be paid for examination service in clinics or private offices.

Question 11: What is your opinion as to the proper scope of function of the physician in the public schools?

Answer: Forty-two per cent of the comments on the function of the physician in the public schools were concerned with the discovery of children in need of medical care in order to guide the parents to a proper use of medical services. While this function is pretty generally accepted, there was also emphasis upon certain special problems such as high school pupils engaging in competitive sports; the reference of pupils with suspected illness; the examination of teachers and other school staff; and attention for those pupils with behavior problems and with conditions affecting educational achievement.

It is significant that 115 physicians showed a recognition of the need for a medical advisor and consultant on the School Health Program; and among these we find mention of the need for the physician to act as co-ordinator, liaison officer, supervisor of various health personnel, as well as to act as an advisor on the curriculum, hours of school, recreation, the food of school lunches, and health surveys.

Communicable disease control activities were mentioned by 100 physicians, as well as various references to participation in immunization and tuberculin testing.

Question 12: What in your opinion are the chief weaknesses of the school medical service as it operates in your community?

Answer: Ninety-six per cent of the answers to this question expressed some definite dissatisfaction with the service. The most frequent criticism was concerned with the quality of the examinations, which was noted in 170, or over 38 per cent of the replies. Almost as frequently (in 154 replies) we find some criticism of the qualifications of the physician in the schools; so it is apparent that the pediatricians are much concerned over the quality of services rendered in the schools. Thirty-five physicians mentioned politics as interfering with the service.

One hundred and two physicians reported "insufficient staff"; "physicians underpaid" or "no school physician" was the chief weakness. We note that 186 replies included such specific criticisms of the examination as "generally inade-

quate''; ''superficial''; ''lack of medical histories''; ''overemphasis on certain phases, such as height and weight and tonsils and adenoids''; ''glaring defects only recognized''; ''overemphasis on minor defects''; ''diagnosis too positive or wrong'' or ''doctors do not use good judgment.''

The comments criticizing the qualifications of the school physician included ''training generally inadequate''; ''lacks training in pediatrics'' or ''lacks training in [other] fields such as public health and contagion'' or ''that gynecologists, dermatologists, ear, nose and throat specialists, or pathologists are employed'' or ''that physicians should be full time.'' One commented—''part-time physicians should be employed because if full-time doctors are employed the caliber is not so high.''

One-fourth of the physicians made some complaint about too much free service; children were inoculated against diphtheria or vaccinated who could afford to pay a private physician, or the school service is set up in competition with the practitioner, or that it encourages state medicine.

About 11 per cent of the physicians mentioned the need for more emphasis upon education in the program. Not infrequently, the pediatricians point out that parents get a false sense of security through relying on the limited examinations in school; and that other parents are unnecessarily frightened by the reports of physical defects. A lack of, or insufficient, follow-up, was mentioned 53 times.

The school nurse came in for criticism 79 times, with such comments as ''too much left to the nurse'' or ''too much diagnosis,'' ''too much treatment'' or ''too much authority assumed by the nurse.''

The chief weaknesses of the school medical service which we have presented here indicate clearly that the members of the Academy are truly interested in the kind of service offered in their community. The large proportion of replies to the questionnaire, the many detailed comments and requests for assistance, are further indications of interest. We believe this interest and criticism offer a sound basis for constructive leadership to improve the character of the service. The principles for guidance in future development are presented with the hope that they may be useful for this purpose.

Question 13: What are the chief benefits of the school medical service as it operates in your commuunity?

Answer: Ninety-one per cent of the replies to this question mentioned one or more benefits from the service in their community. Nearly half of the replies mentioned the examination and the discovery of physical defects and over one-third of the replies mentioned the control of communicable disease. Nearly as many listed educational benefits to parents, children, and teachers in such forms as the following: ''Makes the public physical examination conscious''; ''Points out the need of regular child health supervision by family physician''; ''Makes parents more health conscious''; ''Educating the laity and, through them, the indifferent doctor''; ''Points out neglect to parents. Enforces attention to many cases medically important''; ''It does tend to overcome the lethargy of parents and welfare agencies in having defects corrected—although not completely''; ''Value of prevention rather than cure''; ''Increase in cooperation between patient and doctor, due to increase in intelligence.''

School Medical Service Principles

Introduction

The following set of general principles is proposed to guide in the development of medical service for public schools. The confusion between the ideal of periodic health examinations combined with the individual medical health supervision that

may be given by the private practitioner of preventive pediatrics and the service that is practical for large groups in public schools has indicated the need for more agreement upon guiding principles. As this school service is a problem of interest to physicians, parents, taxpayers, school administrators, and teachers as well as several kinds of special health personnel in schools, public health officials, social workers and other public leaders, it seems necessary for some group to take the initiative in proposing some general principles that all might agree upon for school medical service in the United States.

Today there is a growing recognition of the fact that the school facilities alone cannot meet the full need for health examinations and preventive medical service for school age children. It appears clear that this problem should be approached as a part of the larger problem of the cost and distribution of medical care. We recognize, too, the need for more adequate health education and school health programs and so the school has enough responsibility of its own without attempting to take over the larger problem of preventive medical care which should not be divorced from sick care medical service. While there may be differences of opinion as to which medical services should have preference in a school health program, we can agree that there is little prospect that public schools, generally, will provide a satisfactory substitute for the individual attention of the personal physician working with the parent and the child.

With a thorough recognition of the need for a better distribution of systematic, periodic examinations, re-examinations and health supervision for children and with the experience of pediatricians studying this problem in the schools and through the activities of the White House Conference, the American Academy of Pediatrics has proposed these general principles as a basis for better understanding and agreement in the development of this school service.

Five Principles

The following set of principles is proposed to guide in the development of medical service for public schools.

1. The school medical service should be thoroughly coordinated with the other community medical facilities.
   a. The service should be conducted in a manner that will encourage the cooperation of all proper community medical facilities.
   b. The service should not conflict, nor compete, with the private practitioner or other medical facilities either through treatment, through diagnosis, or through giving examinations or advice that interferes with or is a substitute for other community medical facilities.
2. The advice which is given to parents, pupils, or school staff should meet the best medical standards.

   In order to carry out this principle the examination and medical inquiry must meet the following requirements:

   a. The responsibility for the character of medical service must be borne by the medical profession. (Fifth Principle of American Medical Association principles.)
   b. There should be accurate detection of defect cases.
   c. The recommendations for medical care must be backed by authority, be practical, and carry a reasonable likelihood of need. Education for periodic health examinations should not be confused with a specific recommendation for medical care.
   d. The examination service should be limited both in the number of pupils and in the examination procedure in order to maintain the best medical standards.

It should be limited as far as necessary for effective service with given resources. (No demand for covering large numbers of children, nor for covering particular examination techniques should interfere with the judgment of the physician in giving advice to parents, pupils, or school staff.)

3. The services of the physician in the school should contribute to sound education.
   a. The contribution of the physician in the school should be explained and interpreted to pupils, parents, and school staff so that the values of the service may be understood and appreciated. The examination should help to encourage a wise use of community medical resources.
   b. Since the school examination service must be limited, this limitation of the examination service should be explained in order to avoid a false sense of security.
   c. Each part of the examination should be clearly defined so that the limitations of the examination may be understood and not carry the presumption that the service offers a worthy example of a health examination.
4. The examination service should provide records that are readily interpreted by those who use them and that permit the follow-up service to give first attention to the more serious cases.
   a. Next to the educational contribution of the examination service the chief purpose of the service and outcome of the examination should be that the adverse conditions revealed are brought to medical attention so that relief for these conditions may be obtained.
   b. The results of the examination should be correlated with the existing community resources through the follow-up service of the nurse and other school staff.
   c. When a case is selected for follow-up service, the limitations of the available follow-up and correction facilities should be considered so that all the selected cases may be given adequate follow-up.
      (To select more cases for follow-up than can be followed through or can receive treatment results in much wasted effort.)
   d. The examination record should show the degree of severity of a defect so that selections for follow-up may be made according to such severity.
5. The detection of defect cases should be made with economy of effort and financial cost. Economy requires:
   a. That all clerical tasks be carried out by a lay assistant to the physician.
   b. That the children be brought to the physician ready for the examination with clothing removed, or loosened; pupils are kept orderly and step into position convenient for the examination without delay; parts of the history obtainable by a lay assistant should be available to the physician.
   c. Routine procedures that do not require medical judgments and skills such as audiometer tests, Snellen tests, and anthropometry, should be conducted by a trained lay assistant and the result should be made available to the physician in convenient form.
   d. The physician should follow a limited, explicitly defined, routine for screening and all cases selected by this routine screening should have sufficient further appraisal of the whole child to advise pupil, parent, and school staff including nurse for follow-up.
   e. The extent or adequacy of the screening routine or technique should be determined by the examining physician in collaboration with the medical supervisor on the basis of three determining factors:
      a. The time allowed for the physician in proportion to the number of pupils.

b. Facilities for follow-up. (Examinations without follow-up are of little value. If follow-up facilities are inadequate, special surveys to indicate this inadequacy would be more reasonable than an accumulation of records of defect cases that cannot be followed up.)

c. The facilities for correction: For pupils requiring free or part-pay facilities for correction there is no point in accumulating year after year defect cases that cannot receive the medical care needed. However, sufficient evidence should be accumulated to establish the need for facilities.

Harold M. Mitchell, Chairman
Rockwell M. Kempton — *Clifford D. Sweet*
M. Hines Roberts — *LeRoy A. Wilkes*
A. Clement Silverman

Report of the Council for Pediatric Research

This council, as was explained in previous reports, was an outgrowth of the experiences and suggestions of the Academy's Committee on Clinical Investigation and Scientific Research, as embodied in their report presented at the annual meeting in 1935, and published in THE JOURNAL OF PEDIATRICS for July of that year. Originally designated "The Committee for Allocation of Funds for Research," at the meeting of the Executive Board in December, 1935, the committee was rechristened the "Council for Pediatric Research of the American Academy of Pediatrics" and the council was given practically an autonomous status, though remaining as a unit within the Academy (THE JOURNAL OF PEDIATRICS, January, 1936). Its members at that time were: Chairman, Kenneth D. Blackfan; Secretary, Fritz B. Talbot; Thomas B. Cooley, Alexis F. Hartmann, and Irvine McQuarrie. Recently Oscar M. Schloss has been added to the list.

The council has felt from the start that it must proceed slowly, and that in order to accomplish its ends it must have an office, with the usual appurtenances and an executive secretary who should be able to devote a good deal of time to the work. While it was probable that these necessities might be financed by contributions from a few commercial firms interested for their own ends in furthering certain types of research, this did not seem desirable, and support for a trial period was sought by the chairman and secretary from various philanthropic foundations; and finally, in March of this year, word was received from the Carnegie Corporation of a grant of $10,000 a year for a two-year period in which to try out the ideas developed by the council at its meetings and in discussions with various persons representing organizations interested in the problems of research.

At a meeting of the full membership of the council in Boston on March 25, it was decided that an executive secretary should be chosen, an office opened, and a survey of the field and its possibilities completed as soon as possible. Dr. Cooley was chosen to be executive secretary. Office space was offered by the Children's Fund of Michigan in its building at 660 Frederick Street, Detroit, and accepted, and the council is now prepared to begin its real activities.

The purposes to which it has set itself are:

1. To obtain as complete a directory as possible of laboratories interested in research on subjects pertaining to pediatrics; their location; equipment; personnel; financial support and needs; and special interests in research.
2. To make contact with prominent commercial houses who are or should be interested in furthering research; to ascertain their attitude toward the ideas of the council; and to attempt to interest them in supporting the council's plan.
3. To advise with prospective donors of research funds, either commercial firms or private philanthropists; to accept such funds when requested, and allocate them to laboratories and workers competent to use them as best to further the purpose

of the givers. It is believed that such mediation between commercial houses and research laboratories will relieve the laboratories of a possible suspicion of commercialism, and should obviate a considerable waste of funds on ill-conceived research projects.

4. To build up a free fund which can be applied to needed research at the discretion of the council, either from private gifts or from a percentage of funds handled for commercial houses.
5. On occasion, to help coordinate research carried on in different laboratories to avoid needless duplication; and at times to promote obviously desirable investigation.
6. To locate promising young investigators, and where necessary help to place them in suitable laboratories.
7. Ultimately to make the council self-sustaining by assessment of a suitable percentage on the funds which it handles. Such an arrangement has been approved by some commercial houses which have been consulted, while others have been doubtful.

It may be said that conversation with representatives of a few large business interests have indicated that the council might ultimately handle quite large amounts designated for research in various fields. It should be distinctly understood that there is no purpose to interfere with satisfactory established relationships between donors and laboratories except on the initiative of one or both parties concerned, and that it is not the council's expectation that some of the purposes outlined can be attained quickly. Primary attention will be directed to the first two objects mentioned, and it is not probable that any beginning will be made of reception and allocation of funds for a period of months at least.

Kenneth Blackfan, Chairman
Thomas B. Cooley, Secretary
A. F. Hartmann
Irvine McQuarrie
Fritz B. Talbot

Academy News

The next meeting of Region I of the Academy will be held on November 12 and 13, Boston, Mass.

The next meeting of Region II of the Academy will be held on November 30 and December 1, 1937. This meeting will be held in conjunction with the Pediatric Section of the Southern Medical Association in New Orleans, La.

The next meeting of Region III of the Academy will be held on November 4, 5, and 6, 1937, at the Lake Shore Athletic Club, Chicago, Ill.

The next meeting of Region IV will be held on November 4, 5, and 6, 1937, in Los Angeles, Calif.

News and Notes

At the annual meeting of the **Louisiana State Pediatric Society**, held on April 26, the following officers were elected for 1937-38: Dr. Clarence H. Webb, Shreveport, president; Dr. Ralph J. Talbot, Monroe, vice president; and Dr. Ruth Aleman, New Orleans, secretary-treasurer.

At the annual meeting of the **Pediatric Section of the Medical Society of the County of Kings and Academy of Medicine**, Brooklyn, the following officers were elected for 1937-38: Dr. Harry R. Litchfield, Brooklyn, president; Dr. Sidney D. Kramer, Brooklyn, vice president; Dr. Jacob Rosenblum, Brooklyn, secretary; and Dr. Benjamin Stoloff, Brooklyn, treasurer.

Attention is again called to the meeting of the **Fourth International Pediatrics Congress** to be held in Rome, September 27, 28, 29, and 30, 1937. Dr. L. Emmett Holt, Jr., Baltimore, Md., is secretary of the American committee.

At the Forty-Ninth Annual Meeting of the **American Pediatric Society**, held at Hot Springs, Va., April 29, 30, and May 1, 1937, the following officers were elected for the ensuing year: Dr. Kenneth D. Blackfan, Boston, president; Dr. Lawrence T. Royster, University, Va., vice president; Dr. Hugh McCulloch, 325 N. Euclid Avenue, St. Louis, secretary-treasurer; Dr. Heyworth N. Sanford, Chicago, recorder and editor.

The next meeting will be the semicentennial anniversary of the founding of the Society and will be held at Bolton Landing, N. Y., on June 9, 10, and 11, 1938.

The following physicians have been certified by the **American Board of Pediatrics** since the last report. None of these men were examined.

William Nathaniel Braley, Highland Park, Mich.
Florence A. Browne, Detroit, Mich.
Darcy Milliman Dayton, Tacoma, Wash.
Ray S. Friedley, Akron, Ohio
Hal Rexford Hoobler, Oakland, Calif.
Wilfred C. Hulse, New York, N. Y.
Dennis Daniel Kovan, Detroit, Mich.
Frank C. Leeming, Chicago, Ill.
Gordon Manace, Toronto, Canada
Abe Matheson, Chicago, Ill.
Marsh William Poole, Detroit, Mich.
Armin Rembe, Seattle, Wash.
F. Blair Sullivan, Chicago, Ill.

Erratum

In the article, "The Natural History of Rheumatic Fever in the First Three Decades," by May G. Wilson, which appeared in the April issue of the JOURNAL, on page 462 the legends for Charts 7 and 8 were interchanged by mistake.

Book Reviews

The Avitaminoses: The Chemical, Clinical and Pathological Aspects of the Vitamin Deficiency Diseases. By WALTER H. EDDY, PH.D., AND GILBERT DALLDORF, M.D., WITH FOREWORD BY JAMES EWING. 338 pages, 24 plates. Baltimore, 1937, Williams and Wilkins Company, price $4.50.

The authors have prepared an orderly account of the problems, evidence and conclusions respecting the effects of vitamin deprivation. Following a brief introduction, each of the well-recognized vitamins, A, the B complex, C, D, and E, is considered from the standpoint of its chemical nature and properties, its functions, the clinical and anatomic manifestations of its deficiency and the significance of subclinical and borderline conditions that may be associated with its shortage. In this connection, especially, the directions in which future experimental and clinical information should be sought are pointed out. Separate chapters are devoted to the rôle of vitamins in resistance to infection, in blood regeneration and in multiple or complicated effects including dental caries.

A short bibliography of the important references closes each chapter.

The morbid anatomy is well illustrated by excellent plates, mostly photomicrographs of the pathologic tissue changes observable in the deficiency diseases.

Part II (29 pages) contains the standard methods for vitamin bioassays and the clinical tests for vitamins A and C, together with tables of reported vitamin values of common foods.

Several of the structural chemical formulas contain errors and the index of authors is incomplete, but these minor faults do not detract from the value of the book, which is written in narrative style. The emphasis is usually well placed, and the authors have presented an immense amount of factual material and reliable conclusions in condensed and accessible form for the convenient use of physicians, pathologists, and students of nutrition.

H. A. M.

Children Handicapped by Cerebral Palsy. Psychological Factors in Management. Elizabeth Evans Lord, Ph.D., New York, 1937, The Commonwealth Fund. Price, $1.25.

A psychologist writes this book, which is a study of the child handicapped by a defect of the brain. The author stresses throughout that an understanding of this type of child from the psychologic point of view is of the greatest importance in helping him develop into a well-adjusted individual in spite of his physical handicap. In an introductory chapter by Bronson Crothers, the medical aspect of cerebral palsy is described as a "disturbance of motor function due to damage to the brain before, during, or shortly after delivery of the infant." The amount of damage to the brain varies from so small a lesion that only mild motor disabilities result to so great a destruction of the brain that the child never reaches much beyond the intellectual level of idiocy.

In cerebral palsy in children there are certain characteristics which it is well to keep in mind: first, the responsible cause has done its job and is no longer operating; second, the lesion is likely to be diffuse rather than localized; third, the

damage has been inflicted on a growing organism. This last is most important, for the "influence of the lesion on the growth of the brain and upon the drifting patterns of behavior in the developing child explain many of the difficulties which disturb those who take charge and manage these children."

The evaluation of the mental status of these children is the chief concern of the psychologist, and in Chapter 3 the author discusses the mental testing program. In cases of cerebral palsy there is often disagreement between the parents' conceptions of the mental capacity of the child and that of the teacher. This is usually due to the failure to recognize specific disabilities. A Stanford-Binet test may be suitable to estimate the intelligence of a mildly affected child who is able to talk, but a child who is shown to have a very high intelligence quotient may have a specific disability which totally prevents progress in one or more school subjects. The author then advises tests for specific ability and discusses methods by which these may be accomplished.

In helping the handicapped child to develop into a well-adjusted adult, the teacher plays an important part, and in Chapter 5 the teacher's problem is discussed. Successful education leads to the adjustment of the child to his handicap and his obtaining satisfaction in occupations within his ability. This means that the child has not suffered from a sense of inadequacy, but has recognized his capacity in relation to others so that he will not be disappointed when he finishes school and goes into the outside world.

Another chapter, "The Emotional Problems of the Child and Parent," deals with the emotional instability of many of these children. A large percentage of handicapped children belong to this group showing marked emotional disability, and the general impression is that this is directly due to damaged brain. The author had found that many children of average or more than average intelligence are quite well controlled emotionally. Since in these children the motor disability is slight, physical independence may account to a certain extent for this stability, but this can account for only a small proportion. The severely handicapped children are passive if physically comfortable. Children mentally normal, or nearly so, present the greatest problem in adjustment. If these children are severely handicapped, the conflict between themselves and their parents is greatly emphasized. This attitude can be corrected, and the child helped to lead a happy life by the early establishment of routine. The child whose defect is relatively slight is likely to suffer from self-consciousness and a feeling of inadequacy brought about by unsuccessful competition.

These brief notations serve to indicate the breadth of view of the writer of this book. In this brief treatise of about 100 pages the author succeeds in placing before the reader the most important problems which the child, the parent, the teacher, the psychologist, and the physician face. In a straightforward, simple fashion Lord gives the reader an idea of the complexity of the problems which children handicapped by cerebral palsy present. As a result of the study of 300 children over a considerable length of time, the author is convinced of the great importance of repeated psychologic tests of the specific abilities of these children in order to assist the doctor, the teacher, and the parent. The aim is so to guide these children that they may use their abilities to the utmost, and at the same time recognize their handicap and obtain satisfaction in occupations within their ability. In this way the child is not pushed beyond his capacity, and much emotional disturbance is avoided.

S. I. S.
M. L.

Comments

Seventh Annual Meeting

The Seventh Annual Meeting of the Academy held at the Waldorf-Astoria Hotel in New York on June 3, 4, and 5 was most successful. The total number of registrations was 785 of whom 366 were Fellows of the Academy. The program was excellent, and both the scientific and the commercial exhibits were larger than at any previous meeting. For the first time the meeting extended over three days. The complete minutes of the meeting, with committee reports, appear in this issue. Attention is particularly called to the report of the Committee on School Health and School Health Education and to the report "Nutritive Food Requirements During the First Year of Life" by the Health Organization of the League of Nations.

Members in attendance will never forget the fascinating "Classroom of Tomorrow" program held under the direction of the Department of Education of the Handicapped at Teachers College, Columbia University, assisted by numerous schools and individuals. The exhibitions were held before, between, and after the daily regular sessions. Demonstrations of the education of the blind, crippled and cardiac children, the deaf, and the hard of hearing were given, and the exhibition showed marvelous planning and program making. What is being done today for the future of these handicapped children was a revelation to most members of the Academy, and no one who was privileged to see this classroom could return home without a bigger and finer conception of pediatrics. The Academy is deeply indebted to those who must have given so much time and effort to the demonstrations. The writer of this comment cannot recall ever before having seen a more carefully planned and worked out schedule of demonstrations.

The Council for Pediatric Research

An interesting and probably important experiment fostered by the Academy of Pediatrics is just getting under way. This is the Council for Pediatric Research, whose report appears in the Transactions of the Academy. The desirability of an agency of this kind has been under discussion for some time, and the first steps were taken by the Academy in 1935, in the creation of the Committee on Allocation of Funds for Research, which, though still a unit within the Academy, was later given practically autonomous status under its present title.

The primary reason for considering the creation of such an agency to be desirable was the unsatisfactory state of affairs regarding investigations by various clinics and laboratories financed by subsidies from commercial houses. Drug and food manufacturers spend large sums annually in this way, usually in order to assure themselves of the efficacy of a product before marketing it, though some of the projects are open to the suspicion of being undertaken chiefly for exploitation in advertising. Often the clinic or laboratory is well chosen, and the resulting work brings results of real scientific value. Not uncommonly, however, the commercial house, knowing little of the relative abilities and facilities of investigators, makes an unfortunate choice and wastes considerable sums on ill-planned or slovenly work. In a field where many manufacturers are interested in the same questions, such for

instance as the present furor over the vitamins, there is likely, under this system of direct dealing between manufacturers and investigators, to be a good deal of unnecessary duplication of effort and lack of desirable coordination of studies. In any case, the direct subsidizing of investigators by commercial houses, sometimes rather surreptitious, is not particularly dignified and may lay the published results open to suspicion of bias. These conditions have been for some time recognized both by the commercial houses and by medical men acquainted with what is going on in the research field, and there has been quite general agreement as to the desirability of some agency of recognized competence and integrity which should act as intermediary between business houses on one hand and clinics and laboratories on the other—consulting with the business house as to its problems and how they can be met, finding competent and willing investigators, and taking charge of the necessary financial arrangements. Under such a scheme, the statement on publication that a given study was sponsored by the Council for Pediatric Research should be a welcome guarantee of the ethical status of the arrangement.

This particular activity, while worth while, would hardly in itself be sufficient to attract the interest of a group such as composes the Council. There are other possibilities open to such a group, and these the Council will attempt to develop: one is to accept funds for research from private philanthropy and direct them to proper channels; another is, by acquaintance with work going on throughout the country, to assist in coordination of effort and to stimulate desirable and timely research. The compilation of information about research laboratories, their capacities, type of work, personnel, and financial status, is highly desirable and will be one of the first things attempted by the Council. In making such a compilation, it is probable that promising young investigators will be located and may be given needed assistance. The desirability of a "free fund" which the Council might use to assist or initiate research is obvious, and it is believed that such a fund may be developed by means of a fee charged to business houses for the services of the Council. This idea has met with the approval of some interested firms.

A valuable by-product of the Council's activities may well be developed in the field of education. The Council will probably be in closer touch with the teaching institutions than any other of the pediatric organizations and should therefore be in a position to collect and disseminate information as to the success of different current methods, particularly in the teaching of subjects in the course of development. Examples of the present need of such information are in the teaching of normal growth and development and mental hygiene. Promising developments in such lines of teaching often are in need of financial support, and a part of the Council's usefulness might well be in bringing them to the attention of interested foundations. There are important unexploited fields for educational research which such a body might help to uncover.

It is obvious that such a committee could not establish itself without financial backing. This could probably have been obtained from a few business houses which have manifested interest in the project, but this was not considered advisable, and, after conference with several of the philanthropic foundations, support for a two-year period was obtained from the Carnegie Corporation of New York. By the end of this time it is believed the Council will be practically self-supporting through fees collected from business houses.

The members of the Council are Chairman Kenneth D. Blackfan, Alexis F. Hartman, Irvine McQuarrie, Oscar M. Schloss, Fritz B. Talbot, and Thomas B. Cooley, who will act as executive secretary, with offices at 660 Frederick Street, Detroit.